TAINET

Network Series Modem

T-288C/T-1496terbo/T-1496/ITM-3296bis

USER'S MANUAL

The Professional Partner

TAINET COMMUNICATION SYSTEM CORP.

CONTENTS

FCC REQUIREMENTS

This equipment complies with Part 68 of the FCC Rules. On the base unit of this equipment is a label that contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. IF REQUESTED, THIS INFORMATION MUST BE GIVEN TO THE TELEPHONE COMPANY.

The REN is useful to determine the quantity of devices you may connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all areas, the sum of the REN's of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to your line, as determined by the REN you should contact your local telephone company to determine the maximum REN to your calling area.

If your equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But the advance notice isn't practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC. Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, please contact the following address and phone number for information on obtaining service or repairs.

The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

COMPANY: SUMMIT MICRO DESIGN, INC.
ADDRESS: 485 MACARA AVE., SUITE 901 SUNNYVALE, CA 94086 USA

TEL NO: (408)739-6348

INFORMATION TO THE USER

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device. Pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and if not installed and used in accordance with the instructions may cause harmful interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. The user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

This booklet is available from the US government Printing Office, Washington, DC 20402, Stock NO. 004-000-00345-4.

The shielded RS-232 cable is to be used in order to ensure compliance with FCC Part 15, and it is the responsibility of the user to provide and use shielded RS-232 cable from MODEM to personal computer.

CAUTION: Any changes of modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

Notice

The information in this User's Manual is subject to change without notice.

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1.1 Description

1.2 Technical Specifications

1.3 Ordering Information

CHAPTER 1 :   THE TAINET NETWORK SERIES MODEM

1.1 Description

- The TAINET Network Series Modem included **T-288C**, **T-1496terbo**, **T-1496**, and **ITM-3296bis**, is a high performance, synchronous and asynchronous, full duplex multi-standard modem. It is designed for use on 2-wire dial circuits and 2/4-wire leased lines.

  The TAINET Network Series Modem fully comply with ITU-T V.34 recommendation (up to 33.6kbps) as well as being compatible with ITU-T Recommendations V.32bis/V.32, V.33, V.29, V.27bis, V.26, V.22bis, V.22, V.23 and V.21 international standards, operating at speeds of 14400, 12000, 9600, 7200, 4800, 2400, 1200, 600 and 300bits per second (depend on each model).

  In V.34 and V.32bis/ V.32 modes, echo concellation provides 2-wire full duplex operation over all PSTN circuits including those with satellite sections. Compatibility is also provided with Bell 212A and Bell 103 operating standard.

- V.34 mode providing full duplex operation at up to 28.8 kbps (33.6/31.2kbps at proprietary mode) with line probing, symbol rate and carrier frequency selection (for T-288C only).

- A range of performance enhancing techniques are available for V.34 mode, including Adaptive Precoding, Non-Linear Encoding (Warping), Constellation Expansion, Multidimensional Trellis coding and Shell Mapping (for T-288C only).

- A 2 by 16 characters LCD display with back lighted control for configuration set-up and monitoring conveniently.

- There are 10 factory default profiles and 10 user's profiles of your easiest configuration setting.

- Line status monitoring including transmitted/received signal level, S/N ratio, signal quality, frequency shift, delay, echo, retrain count, Tx/Rx baud rate, Tx/Rx frequency, ..., etc.

- V.13 simulated carrier control & pseudo HDX control for half duplex application.

- Automatic dial Back-up and restore with menu or auto.

- Front panel lock features prevents from the operation of unauthorized person.

- Remote configuration & status by secondary channel.

- Password call back security.

- Network Management System available.

- 16 modem cards rack shelf available.

- Tx power back-off comply V.34 power reduction recommendation.

1.2 Technical Specifications

The **T-288C** fully comply with ITU-T recommendations V.34, V.33, V.32bis, V.32, V.22bis, V.22, V.21, V.23, V.29, V.27bis, V.26, V.24, V.28, V.25, V.25bis, V.52, V.54, V.42, V.42bis, V.8, and BELL 212A/103 operating standards.

The **T-1496terbo** fully comply with V.32 terbo and ITU-T recommendations V.32bis, V.32, V.22bis, V.22, V.21, V.23, V.24, V.28, V.25bis, V.52, V.54, V.42, V.42bis, and BELL 212A/103 operating standards.

The **T-1496** fully comply with ITU-T recommendations V.32bis, V.32, V.22bis, V.22, V.21, V.23, V.24, V.28, V.25bis, V.52, V.54, V.42, V.42bis, and BELL 212A/103 operating standards.

The **ITM-3296bis** fully comply with ITU-T recommendations V.33, V.32bis, V.32, V.22bis, V.22, V.21, V.23, V.29, V.27bis, V.26, V.24, V.28, V.25bis, V.52, V.54, V.42, V.42bis, and BELL 212A/103 operating standards.

- Modem Protocol   : Please refer to table 1-1.

- Clock Tolerance
  (1) Synchronous   : ± 0.01%
  (2) Asynchronous : Basic range + 1% to - 2.5%
                        Extended overspeed range + 2.3% to - 2.5%

- DTE Speed (The following speed with (*) mark depends on each model.)
  (1) Synchronous   :
        T-288C   ⇨ 33600/31200/28800/26400/24000/21600/19200/16800 /14400/12000/9600/7200/4800/2400/1200 bps
        T-1496 terbo ⇨ 19200/16800/14400/12000/9600/7200/4800/2400/1200 bps
        T-1496   ⇨ 14400/12000/9600/7200/4800/2400/1200 bps
        ITM3296 bis ⇨ 14400/12000/9600/7200/4800/2400/1200 bps
  (2) Asynchronous: 115200/76800/57600/38400/*33600/*31200/*28800/*26400 /*24000/*21600/19200/*16800/14400/12000/9600/7200 /4800/3600/2400/1200/600/300 bps with speed conversion.

      Total bit length : 8, 9, 10, 11 bits
      Parity bit   : odd, even, none
      Stop bit   : 1, 1.5, 2 bits

- Error Correction   : MNP 4/ITU-T V.42

- Data Compression   : MNP 5/ITU-T V.42bis

- Flow Control   : Hardware   CTS/RTS, CTS only
                            Software   X-ON/X-OFF

- Dial Command : Extended AT and ITU-T V.25bis command set.

- G3 Fax Modulation and speed   : V.29   -- 9600, 7200 bps
                                             V.27ter   -- 4800, 2400 bps
                                             V.21 channel 2 -- 300 bps

TABLE 1-1A : Modem Protocol (Applicable to 4/2 wire L-L or D-L)

Operating Mode		Mod.	Carrier	Symbol Rate	Constellation points
V.34+	33600	SM	(Table 1-1c)	(Table 1-1c)	4 to 1024 Depends on the combination of data rate, symbol rate and constellation expansion chosen.
V.34+	31200	SM			
V.34	28800	SM			
V.34	26400	SM			
V.34	24000	SM			
V.34	21600	SM			
V.34	19200	SM			
V.34	16800	SM			
V.34	14400	SM			
V.34	12000	SM			
V.34	9600	SM			
V.34	7200	SM			
V.34	4800	SM			
V.34	2400	SM			
V.32terbo	19200	TCM	1800	2400	512
	16800	TCM	1800	2400	256
V.32bis	14400 T	TCM	1800	2400	128
V.32bis	12000 T	TCM	1800	2400	64
V.32	9600 T	TCM	1800	2400	32
V.32	9600	QAM	1800	2400	16
V.32bis	7200 T	TCM	1800	2400	16
V.32	4800	QAM	1800	2400	4
V.22bis	2400	QAM	1200/2400	600	16
V.22	1200	DPSK	1200/2400	600	4
V.23	1200/75	FSK	1700/420	1200	N/A
V.23	600/75	FSK	1500/420	600	N/A
V.21	0-300	FSK	1080/1750	300	N/A
BELL 212A	1200	DPSK	1200/2400	600	4
BELL 103	0-300	FSK	1175/2125	300	N/A

TABLE 1-1B : Modem Protocol (Applicable to 4 wire L-L)

Operating Mode		Mod.	Carrier	Symbol Rate	Constellation points
V.33	14400 T	TCM	1800	2400	128
V.33	12000 T	TCM	1800	2400	64
V.33	9600 T	TCM	1800	2400	32
V.33	7200 T	TCM	1800	2400	16
V.33	4800	QAM	1800	2400	4
V.29	9600	QAM	1700	2400	16
V.29	7200	QAM	1700	2400	8
V.29	4800	DPSK	1700	2400	4
V.27 bis	4800	DPSK	1800	1600	8
V.27 bis	2400	DPSK	1800	1200	4
V.26	2400	DPSK	1800	1200	4
V.26	1200	DPSK	1800	1200	2
V.23	1200	FSK	1700	1200	N/A
V.23	600	FSK	1500	600	N/A

Notes: TCM : Trellis Code Modulation

QAM : Quadrature Amplitude Modulation.

DPSK : Differential Phase Shift Keying.

FSK : Frequency Shift Keying.

SM : Shell Mapping with 4 Dimensional Trellis Coded Modulation

TABLE 1-1C : V.34 Symbol Rate and Carrier Frequency

Symbol Rate (Baud)	Low Carrier (Hz)	High Carrier (Hz)
2400	1600	1800
2743	1646	1829
3000	1800	2000
3200	1829	1920
3429	1959	1959

- Transmit Level   : 0~-31 dBm adjustable by 1 dB step for leased-line application.
                        0~-15 dBm adjustable by 1 dB step for dial-line application.

- Line Requirement : 4/2 wire Leased Line & Dial Line

- Line Impedance   : Balanced 600 ohms ± 10 %

- Return Loss   : > 24 dB, 300 - 3400 Hz

- Longitude Balance : > 60 dB

- Dial Line Characteristics:
  Maximum Current : 120 mA
  Holding Resistance :50 ~ 220 Ω
  Holding Current   : 20 ~ 110 mA
  Ring Detect Range : ON   -   > 27 Vrms
                      OFF -   < 13 Vrms
  Ring Detect Frequency: 16 - 50 Hz
  DTMF Characteristics: O/P Lowband -8 ± 1 dBm
                             O/P Highband -6 ± 1 dBm
                             Frequency Tolerance ≤ ± 1 %
                             TONE Duration and Spacing 72 ms (adjustable)
  Pulse Per Sec   : 10 ± 0.5 PPS
  Make/Break Ratio : 33/67, 39/61 ± 3 %

- Auto Answer   : V.32bis/V.32/V.22 Comply to ITU-T V.25 & V.25bis
                        V.34 meets ITU-T V.8, V.25/V.25bis
                        Answer Tone: 2100±15Hz

- Calling Tone   : Comply to ITU-T V.8, V.25

- Receive Range   : +3 ~ -43 dBm

- Dynamic Range   : +3 ~ -26/+3 ~ -40/-6 ~ -33/-6 ~ -43 dBm (for T-288C)
                        +3 ~ -26/+3 ~ -40/-6 ~ -33/-6 ~ -43 dBm (for ITM-3296bis)
                        +4 ~ -33/-4 ~ -43dBm (for T-1496 & T-1496terbo)

- Loss Carrier Detect Time : 1 ~ 15 Secs

- Frequency Shift   : Compensation cancel at least of ± 7Hz offset

- Equalization   : Automatic Adaptive Equalizer & M1040/CABLE
                        Compromise EQ (M1040 is for T-288C & ITM-3296bis only.)

- Far-end Echo Coverage: The Far Echo Canceller can handle a Round Trip Delay of
                         Up to 1.5 sec. at 3429 baud, and 2.1 sec. at 2400 baud.

- Scrambler & Descrambler: Comply to the ITU-T V.32bis, V.32,
  V.22bis, V.22, V.27bis, V.29, V.33, V.34

- Data And Control Signal: Output voltage± (6 ~ 12)V
  (ITU-T V.28)   Input voltage   ± (3 ~ 25)V
                              Output impedance   300 ~ 330 Ω
                              Input impedance   3000 ~ 7000 Ω

- Tx Clock Source   : Internal/External/Loopback
  Freq. Tolerance   : ± 0.01 %
  Duty Cycle   : 50 ± 1 %

- Test Features   : V.54/V.52 , LAL/DL/RDL

  Test Patterns - 511/ALT/ ★2047 (★ is for T-288C/ITM-3296bis only.)

- Power Requirement : 90 ~ 265 VAC auto range, 47 ~ 63 Hz
  DC Source   : -36 ~ -72 VDC option (for Rack)
  Dual Redundant AC or DC Power Supply option (for Rack)

- Power Consumption:

	T-288C	ITM-3296bis	T-1496terbo & T-1496
Stand Alone	8.5 W	7.5 W	6.5 W
Rack mounted Card	6.5 W	6 W	5 W
Full Shelf	100 W	90 W	80 W

- Operating Temperature: 0 °C ~ 50 °C
  Storage Temperature: -25 °C ~ 70 °C
  Relative Humidity: up to 95 % (non-condensing)

- Physical Size:
  Stand Alone Modem ⇨ W - 194mm, H - 60mm, D - 316mm, Weight 1.9kg
  Rack Mount Card   ⇨ W - 220mm, H - 26mm, D - 328mm, Weight 0.6kg
  Rack Mount Shelf   ⇨ W - 19", H - 5RU, D - 380mm, Weight 8kg
  Full Shelf Equipped ⇨ Weight 16kg

- DTE Interface: EIA RS-232D, CCITT V.24/V.28

NO	V.24	DESCRIPTION	SOURCE
1	101	(PG) Protective Ground	—
2	103	(TXD) Transmit Data	DTE
3	104	(RXD) Receive Data	MODEM
4	105	(RTS) Request To Send	DTE
5	106	(CTS) Clear To Send	MODEM
6	107	(DSR) Data Set Ready	MODEM
7	102	(SG) Signal Ground	—
8	109	(DCD) Data Carrier Detect	MODEM
9		+12 VDC	MODEM
10		-12 VDC	MODEM
15	114	(TXC)Transmit Clock	MODEM
17	115	(RXC) Receive Clock	MODEM
18	141	(AL) Local Analog Loopback	DTE
20	108	(DTR) Data Terminal Ready	DTE
21	140	(RDL) Remote Digital Loopback	DTE
22	125	(RING) Ring Detect	MODEM
24	113	(XTC) External Clock	DTE
25	142	(TST) Test Mode	MODEM

1.3 Ordering Information

- T-288C   Stand alone type V.34 33.6kbps modem
- T-288NC   Rack-mounted V.34 33.6kbps modem (for TRS16)
- T-1496terbo   Stand alone type V.32terbo 19.2kbps modem
- T-1496   Stand alone type V.32bis 14.4kbps modem
- T-1496Nt   Rack-mounted V.32terbo 19.2kbps modem (for TRS16)
- T-1496N   Rack-mounted V.32bis 14.4kbps modem (for TRS16)
- ITM-3296bis   Stand alone type V.33/V.32bis 14.4kbps modem
- ITM-3296Nb   Rack-mounted V.33/V.32bis 14.4kbps modem card (for TRS16)
- NMC16   NMS Control unit used with TRS16
- TRS16   19" width rack for up to 16 modem cards
- PW-130AC   90 ~ 265 VAC 130W power unit for rack
- PW-130DC   -36 ~ -72 VDC 130W power unit for rack
- TAINET MANAGER®   The V.34/V.32bis/V.32 Network Management System

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CONTENT

CHAPTER 2 INSTALLATION

2.1 Description

This chapter provides the information needed to install the TAINET Network Series Modem and to ensure that it is working properly. You may obtain more information about this subject for rack-mount modem shelf from the User's Manual of TAINET rack-mount modem shelf.

2.2 Unpacking

Save the carton and protective packing material in which your TAINET Network Series Modem was shipped; you might need them for repackaging if you have to store or ship the modem in the future. The following items are shipped with your TAINET Network Series Modem:

➢ One User's Manual for TAINET Netwok Series Modem.
➢ One 7-feet (2.13m) modular telephone cable for connection to an RJ45 8-pin jack.
➢ One 7-feet (2.13m) modular telephone cable for connection to an RJ11 4-pin jack.
➢ One 8-pin box for leased line application.

Rough handling during shipping causes most early modem failure; after you unpack the modem, check carefully for shipping damage. Contact the shipper if you notice any damage.

Direct any additional questions about damaged or missing parts to the nearest sales representative, or contact:

TAINET Communication System Corp.
Customer Service Department
No. 25, Alley 15, Lane 120, Sec. 1,
Nei-Hu Rd, Taipei 114, Taiwan
TEL: 886-2-26583000
FAX: 886-2-26583232

2.3 Site Requirements

The FCC requires telecommunications equipment to withstand electrical surges which may result from lightning strikes; the TAINET Network Series Modem meet the requirements set forth by the FCC. The following procedure outlines some common practices which can minimize the risk of damage to computer equipment from electrical surges.

1) Make sure the electrical service in your building is properly grounded as described in article 250 of the National Electrical Code (NEC) handbook.

2) Verify that a good copper wire of the appropriate gauge, as described in Tables 250-94/95 of the NEC Handbook, is permanently connected between the electrical service panel in the building and a proper grounding device such as:

    ☞   A ground rod buried outside the building at least 8 feet (2.44 meters) deep in the earth.

    ☞   Several ground rods, connected together, buried outside the building at least 8 feet (2.44 meters) deep in the earth.

    ☞   A wire (see tables 250-94/95 of the NEC handbook for gauge) that surrounds the outside of the building and is buried at least 2.5 feet (.76 meters) deep in the earth. Note: The three grounding   devices   described   above should be firmly placed in the earth. Soil conditions should not be dry where the device is buried.

    ☞   A metal water-supply pipe connected to the water main in the street or a metal cased well. The water pipe used must not have plastic piping between the ground connection and the water main (or the well). The connection should be made where the pipe enters the building. The water meter must be shunted by a copper strap.

3) If you are unsure whether the electrical service in your building is properly grounded, have it examined by your municipal electrical inspector.

4) Install a surge protector between the modem and AC power outlet. Any additional computer equipment you have connected to the modem (directly or through another device), such as a terminal or printer, should also be plugged into the same surge protector. Make sure that the surge protector is properly rated for the devices you have connected to it.

5) Call your telephone company and ask them if your telephone line is equipped with a circuit surge protector.

6) If you are operating the modem in an area where the risk of electrical surges form lightning is high, disconnect the modem form the telephone line at the modem's rear panel when it is not in use.

2.4 Site Selection

Locate the TAINET Network Series Modem no farther than 50 feet (15.24 meters) from your data terminal equipment (DTE) and within 6 feet (1.83 meters) of a grounded AC outlet furnishing the required power.

Install the modem in a clean area that is free from environmental extremes. Allow at least 6 inch (15.24 cm) in front of the modem for access to the front panel, and at least 4 inch (10.2 cm) in back for cable clearance. Position the modem so you can easily see the front panel. Do not stack the TAINET Network Series Modem on top of another modem.

*CAUTION: To avoid overheating the TAINET Network Series Modem, do not place anything within 1 inch (2.54 cm) of either side of the modem, and do not place the modem on its side.

2.5 AC Electrical Outlet Connection

Check the label on the bottom of the modem for the unit's power requirements. Once you are certain the power requirements specified on the label match those of your electrical outlet, plug the power cable into the outlet.

Once the TAINET Network Series Modem is installed as described in the previous sections, you may turn the power on. The modem performs a self-test before the TAINET Network Series Modem greeting message appears on the liquid crystal display (LCD) on the modem front panel.

2.6 Connecting With Dial Line

To connect your modem to a permissive RJ11 voice jack and dial line as follows:

1) Connect the 4-pin modular to 4-pin modular cable provided to connect your modem to telephone set via an RJ11 jack for manual dial operation or voice transmissions.
2) Connect one end of the 4-pin to 4-pin modular cable to the DIAL connector on the modem rear panel and the other end to the telephone line modular jack.

The pin layout of the PHONE connector for RJ11 operation is as follows:

Modem PHONE Connector Pin No.	PHONE Jack Function	CABLE Wire Color Assignment
1	N/C	N/C
2	Not Used	Black
3	Tip	Red
4	Ring	Green
5	Not Used	Yellow
6	N/C	N/C

The pin layout of the DIAL LINE connector for RJ11 operation is as follows:

Modem DIAL LINE Connector Pin No.	DIAL LINE Jack Function	CABLE Wire Color Assignment
1	N/C	N/C
2	Not Used	Black
3	Tip	Red
4	Ring	Green
5	Not Used	Yellow
6	N/C	N/C

Fig 2-1 : Dial Line Connection

2.7 Connecting With Leased Line

For the leased line connection, you should connect the lines RJ45 connector labeled with "Leased" on the back of the TAINET Network Series Modem.

	Modem Pin No.	Color	2-Wire	4-Wire
	1	Blue	TX/RX	TX
	2	Orange	TX/RX	TX
Leased Line	3	Black		RX
	4	Red	TX/RX	TX
	5	Green	TX/RX	TX
	6	Yellow		RX
	7	Brown		RX
	8	White (or Gray)		RX

For 2-wire applications, only pin 1, 2 or pin 4, 5 are required. Whereas, You need to connect pin 1,2,7, 8 or pin 4, 5, 3, 6 in 4-wire applications.

When you connect two modems in "back-to-back" style, don't forget to interchange TX and RX lines.
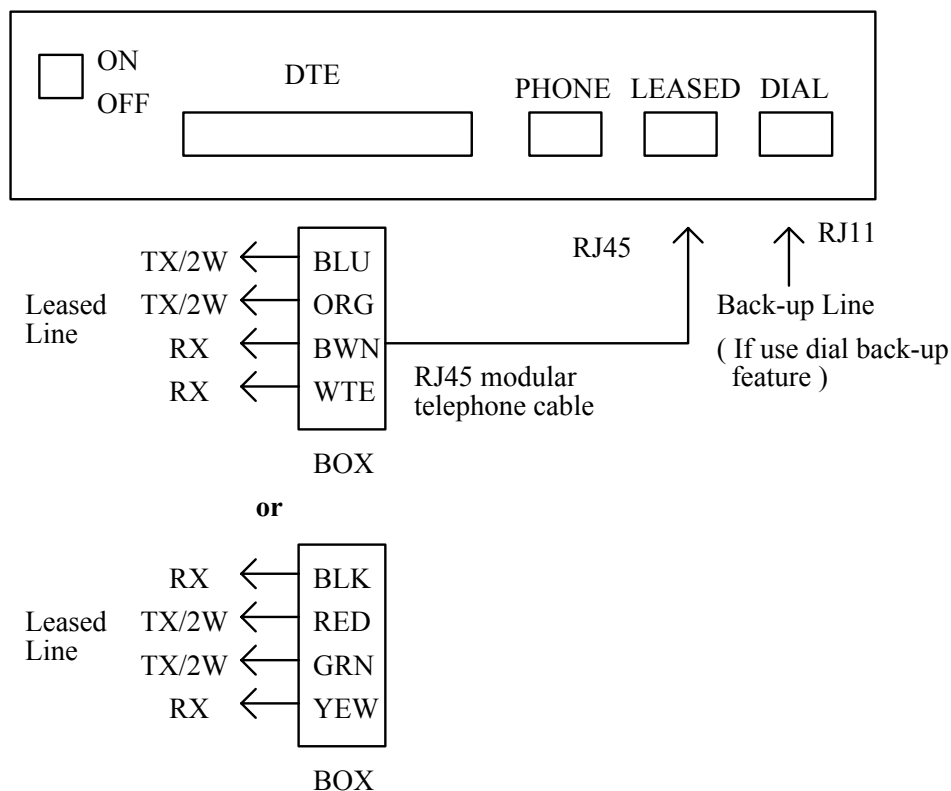
Fig 2-2 : Leased Line Connection

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CONTENT

CHAPTER 3 :   FRONT PANEL LCD AND MENU-DRIVEN

3.1 The Front Panel Description

The front panel of TAINET Network Series Modem contains five touch switches (VO/DA Key, Right Key, Left Key, ENTER Key and EXIT Key) for direct operation, one 2 x 16 characters LCD displays and ten LED indicator lights providing a visual check of the modem's status. The front panel of the TAINET T-288C, T-1496terbo, T-1496, and ITM-3296bis are illustrated as blew:
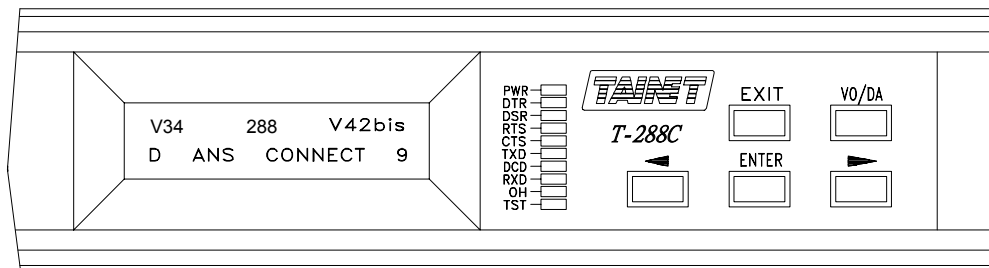
Figure 3-1 TAINET T-288C front panel
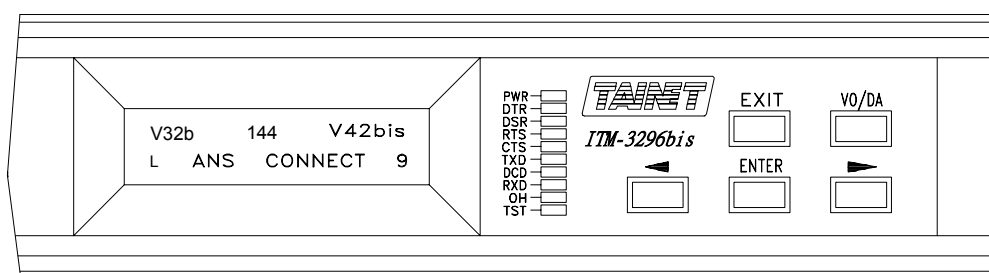
Figure 3-2 TAINET ITM-3296bis front panel
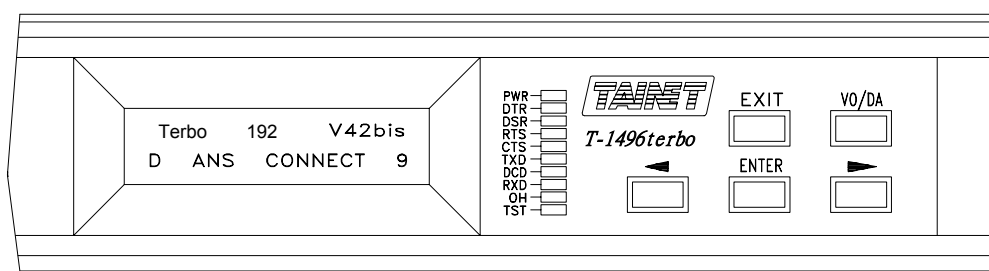
Figure 3-3 TAINET T-1496terbo front panel
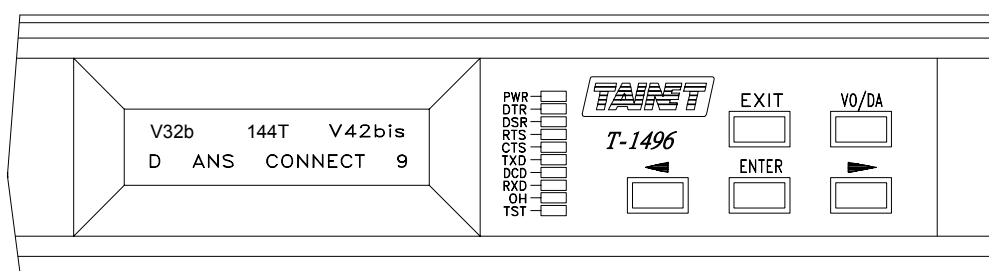
Figure 3-4 TAINET T-1496 front panel

3.2 The Rear Panel Description

The rear panel of TAINET Network Series Modem contains an IEC 320 AC Power Inlet Connector, a Power On/Off switch, a RS-232 connector (connected to DTE Equipment), two RJ11 telephone jack (one connected to dail line and the other one connected to telephone set), and one RJ45 telephone jack (connected to 2-wire or 4-wire leased line), as illustrated below.

For more detailed description, please refer to Chapter 2 "INSTALLATION" of this User's Manual.
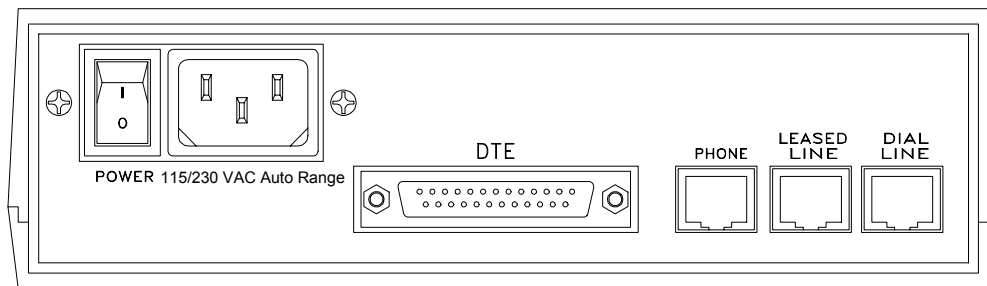
Figure 3-5 TAINET Network Series Modem rear panel

3.3 Operating The TAINET Network Series Modem

1. Keypads : It consists of 5 touch switches.

VO/DA   It is used as the voice/data select key for dial line application, Disconnect/Reconnect selection for Leased Line applications, or "home" key for set-up menu to go back to the home menu.

◀   Left key ; It is used to shift to left field.

▶   Right key; It is used to shift to right field.

ENTER   Enter key; It is used to enter the next lower level menu or confirm selections.

EXIT   Exit key; use it to go back to the upper level menu.

2. LED Indicator : 10 LED bar

PWR --   On for power supply ok.

DTR --   On for DTR signal present.

DSR --   On for DSR signal present.

RTS --   On for RTS signal present.

CTS --   On for CTS signal present.

TXD --   On for "0", off for "1" TXD signal present.

DCD --   On for received carrier signal (DCD) present.

RXD --   On for "0", off for "1", RXD signal present.

OH   --   On for off-hook.

TST --   On for test mode active.

3. LCD Display :

The TAINET Network Series Modem has a 2 by 16 characters LCD with auto backlight control. Some different pictures of the LCD display are shown below.

A. Top Menu

Example:
```
V34    288   V42bis
D ANS  CONNECT 9
```

Description:

1) Modem Protocol: V34 288, V32b 144T, V32 96T, V22b 2400, V29 4800 ....

2) Data Protocol: V.42bis, V.42, MNP-5, Normal, Direct.

3) Line Type: D (Dial Line), L (Leased Line).

4) Mode: ANS-Answer Mode, ORG-Originate Mode.

5) Status: Stanby, Handshaking, Connect, Retrain, Ring...

6) SQ: 9,8,7,6....,0

B.   Menu Select

Example 1 :   Example 2 :

```
+-------------------+          +-------------------+
| L MENU Select     |          | L MENU Select     |
| STATUS            |          | TEST              |
+-------------------+          +-------------------+
```

Description:

1)   In top menu, press "ENTER" key to enter this menu.

2)   Select "LOCAL"or "REMOTE" first if connected.

3)   The character "L" on the upper left corner stands for local.

4)   You may use "▶" and "◀" keys to select menu.

5)   Press "ENTER " key to enter the "MENU".

6)   Press "EXIT" key to quit from this menu.

7)   Note that status menu is not available before connection.

8)   Remote Status menu is not available before connecting and secondary channel
     should be set to ON.

C.   Menu Screen

Example 1 :   Example 2 :
```
+-------------------+          +-------------------+
| L STATUS          |          | R CONFIG MODEM    |
| RX Level =-10dBm  |          | TX  clock         |
+-------------------+          +-------------------+
```

Example 3 :   Example 4 :
```
+-------------------+          +-------------------+
| L TEST            |          | L DIAL            |
| LAL        (ON)   |          | Dial a number     |
+-------------------+          +-------------------+
```

Description :

1)   L-Local, R-Remote.

2)   Menu name: STATUS, TEST, DIAL.......

3)   Status or setting: RX Level=-10dBm, LAL = ON

4)   Use "▶" or "◀" keys to shift among field; press "ENTER" key to enter the
selected menu.

D.   Set-up Menu

Example 1 :   Example 2 :

```
+-------------------+          +-------------------+
| LL TX Level       |          | R Protocol type   |
| -10dBm        ←   |          | Auto MNP/V42 ←    |
+-------------------+          +-------------------+
```

1)   Use "▶" or "◀" keys to shift among field, then press "ENTER" key to confirm
and wait for ← appears on the LCD screen.

2)   Press "EXIT" key to quit from this menu.

3.4 The Menu Tree

Main Menu

(If connected)
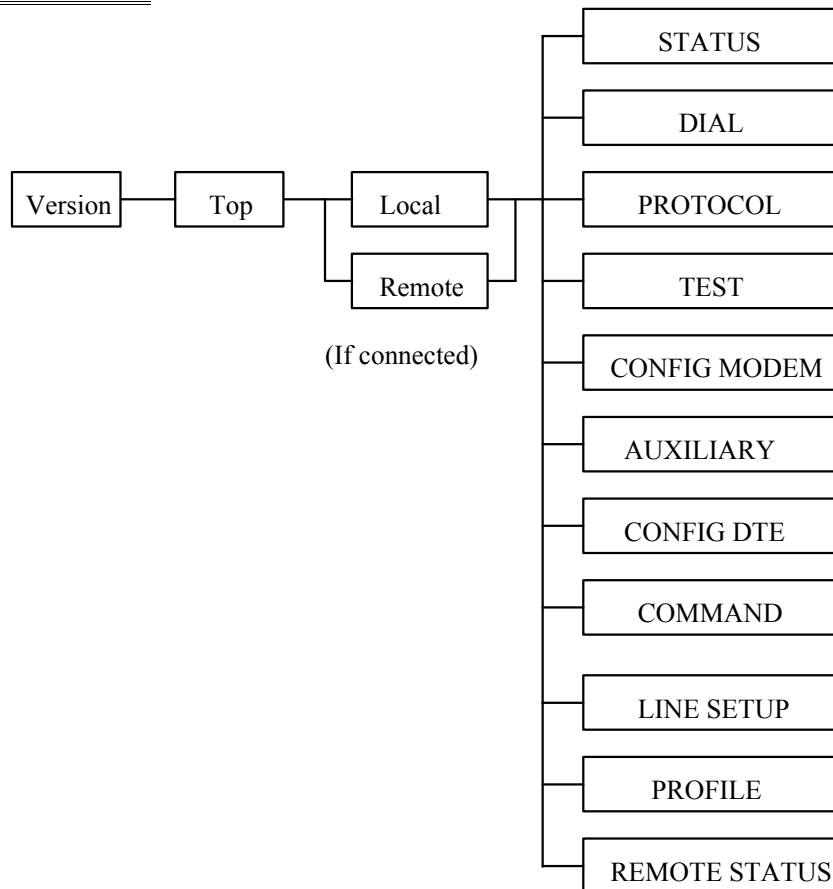
A. STATUS MENU

```
                    è      Tx Level       = -XX dBm
                    è      Rx Level       = -XX dBm
                    è      S/N. Ratio     =  XX dB
                    è      F-Shift        =  X.X Hz
                    è      F F-Shift      =  X.X Hz
                    è  *   Delay          =  XXXX ms
                    è  *   N Echo         =  XX.X dB
       STATUS :  è  *   F Echo         =  XX.X dB
                    è      DTE            =  XXXXX ASY 10
                    è      Retrains       =  XXXXX
                    è  */ RX Baud        =  XXXX
                    è  */ TX Baud        =  XXXX
                    è  */ RX Freq        =  XXXX Hz
                    è  */ TX Freq         =  XXXX Hz
                    è  */ TX PowerOff  =  X dB
```

> ***Note:***   *The function with asterisk mark (*) is only available for V.32 and above.*
> *The function with both (*) and (/) marks is only available for V.34.*

B. DIAL MENU

	è	Dial a Number	#0 nnnn\#1 nnnn\...\#9 nnnn
	è	Edit a Number	#0 nnnn\#1 nnnn\...\#9 nnnn
	è	Ring Times	Auto ANS Off\1 Times...255 Times
	è	Wait For Dial	Immediately\1 Seconds...255 Seconds
	è	Delay Of " , "	Immediately\1 Seconds...255 Seconds
DIAL :	è	Call Timeout	Forever\1 Seconds...255 Seconds
	è	Progress Tone	Basic Code\Don't Care\Dial Tone \Busy Tone\Dial+Busy Tone
	è	Auto Dial Tel#	#0 ..#9
	è	Redial Delay	Immediately\1 Minutes...255 Minutes
	è	Redial Times	Disable Redial\1 Times...255 Times
	è	Dial Type	Tone\Pulse
	è	108.1 Action	Fixed ANS/ORG \Auto By Ring
	è	Login Check	Off\By MODEM\By NMS
	è	Short Ans Tone	1.7 seconds / 2.3 seconds / 3.0 seconds / off

C. PROTOCOL MENU

	è	Protocol Type	Direct\Normal\Auto MNP/V42 \Reliant MNP/V42
	è	MNP Type	None\MNP-4\MNP-5
	è	V42 Detect	400 ms...1900 ms
	è	MNP Block Size	64\128\192\256
	è	Break Option	Break Option-0\...\Break Option-3
	è	Send ADP./ODP.	On\Off
PROTOCOL :	è	SIM. ENQ.	None\SIM.Periphral\SIM. Host
	è	Discon. Method	Immediate\With Clear-down
	è	DCE-DCE Flow	Off\On
	è	DCE Inactive	Forever\1 Minutes...7 Minutes
	è	Resend Times	Forever\12 Times...180 Times
	è	Fast Reset	Normal ATZ,AT&F\Fast ATZ \Fast AT&F \Fast ATZ,AT&F
	è	XON/XOFF Pass	Off\On
	è	Connect Code	DTE Speed \DTE/MOD /EC\DCE /ARQ /MOD /EC
	è	V42 Type	None\V42\V42bis

D. TEST MENU

	è	Clear All	Has Been Done
	è	LAL	Off\On
	è	RDL	Off\On
	è	DL	Off\On
	è	RDL Grant	Off\On
TEST :	è	Manu Retrain	Has Been Done
	è	Test Timeout	Forever\1 Minutes...255 Minutes
	è	TP Type	511\Alter\★2047 (★ is for T-288C and ITM-3296bis)
	è	✠ Error Count	0 ... 224 -1
	è	♣ Error, Sync Loss	0 ... 999999, 0 ... 255

   è B.E.R. Test Off\On

E. CONFIG MODEM MENU

	è	Speed	Adapt\V34+ 336\V34+ 312V34 288\V34 264
			\V34 240\V34 216\V34 192\V34 168\V34 144
			\V34 120\V34 96\V34 72\V34 48\V34 24
			\V32t 192T\V32t 168T\V32b 144T\V32b 120T
			\V32 96T\V32 96\V32b 72T\V32 48\V33 144T
			\V33 120T\V33 96T\V33 72T\V33 48\V29 9600
			\V29 7200\V29 4800\V27 4800\V27 2400
			\V26 2400\V26 1200\V23 1200\V23 600
			\V22b 2400\V22 1200\BELL 212A\BELL 103
			\V21 300 (depend on model)
	è	ORG/ANS Mode	Answer Mode\Originate Mode
	è	Auto Retrain	On\Off
CONFIG :	è	Tx Clock	Internal\External\Loopback
MODEM	è	✠ Compromise EQ.	None\M1040\Cable
	è	♣ Compromise EQ.	0\4\8\12 dB
	è	DCD On Time	0 ms...25500 ms
	è	DCD Off Time	0 ms...25500 ms
	è	Calling Tone	Off\On
	è	V22 Guard Tone	None\550 HZ\1800 HZ (below data signal level 6dB)
	è	✠ Adapt Mode Sel	V.32bis Annex\V.100
	è	♣ AA Tone	Normal\Forced On
	è	✠ Dynamic Range	+3..-26dBm\+3..-40dBm\-6..-33dBm \-6..-43dBm
	è	♣ Dynamic Range	\+4..-33dBm\-4..-43dBm
	è	LL Tx Level	0 dBm...-31 dBm
	è	DL Tx Level	0 dBm...-15 dBm
	è	*/ Power Backoff	Off\On
	è	*/ Pre-coding	Off\On
	è	Remote Config	\S-reg n= 0~ 59\SAVE\LOAD

F. AUXILIARY MENU

	è	SPK.Control	Until DCD On\Always On \Off When Dial\Off
	è	SPK.Volume	Low\Medium\High
	è	Auto FB/FF	Off/On
	è	♣ Compromise EQ.	0\1\2\3 dB
	è	Send Break	Off\On
	è	Long Space Off	Off\On
	è	ASI Overspeed	+1%\+2.3%
	è	V32/33 96T THR	0dB...49dB
	è	120T/96 THR	0dB...49dB
	è	V32/33 72T THR	0dB...49dB
	è	V32/33 48Q THR	0dB...49dB
AUXILIARY :	è	V29/22 96/24Q THR	0dB...49dB
	è	V34 144T SNR THR	0dB...49dB
	è	✠ V29 72 THR	0dB...49dB

è	♣ DL Check Time	Forever\1..255 Minutes
è	*/ TCM State	16\32\64
è	Echo Protect	Off\On
è	RDL By 140	Off\On
è	AL By 141	Off\On
è	*/ V34 Baud Rate	2400\2743\3000\3200\3429
è	Make/Break	US (39%)\UK (33.3%)
è	Ring Off Time	0 Seconds...15 Seconds
è	Call-Back	Off\On
è	Call-Back Time	Immediately\1 Seconds...255 Seconds
è	Call-Back TEL#	#0...#9
è	DTMF Duration	0 ms...255 ms
è	Backlight	On\Off\Auto
è	Remote Grant	On\Off
è	SPK. Monitor	Rx\Rx+Tx
è	Ctrl Carrier	On\Off
è	✞ Jitter Filter	On\Off
è	Auto FB/FF	On\Off
è	Secondary CH.	On\Off
è	*/ Constellation	Normal\Expansion
è	*/ TX Warping	On\Off

> ***Note:*** *The function with (✞) mark is only available for T-288C & ITM-3296bis.*
> *The function with (♣) mark is only available for T-1496 & T-1496terbo.*
> *The function with (⁻/)mark is only available for T-288C.*

G. CONFIG DTE MENU

è	DTE Speed	115200 bps\76800 bps\57600 bps\38400bps \33600bps*\31200bps*\28800 bps*\26400 bps* \24000 bps*\21600 bps*\19200 bps\16800 bps* \14400 bps\12000 bps\9600 bps\7200bps \4800 bps\3600 bps\2400 bps\1800 bps \1200 bps \600 bps\300 bps (* is for V.34 only.)
è	Flow Control	Off\X-On, X-Off\RTS/CTS\CTS only
è	DTR Control	Normal\Auto Dial/ANS
è	DTR Off Action	Force On\Command Mode \Disconnect\Modem Reset
è	DSR Control	Force On\ Normal
è	DCD Control	Normal\V.13 HDX\Psuedo HDX \Force On
CONFIG : è	RTS Control	Force On\Normal
DTE è	RTS/CTS Delay	0 ms...2550 ms
è	DTR Drop Time	0 ms...1500 ms
è	Data Format	SYNC\ASYNC
è	CTS Control	follow CCITT\follow EIA
è	DTR Rise Time	0 ms...1500 ms
è	OH By DTR	Off\On
è	Total Bits	8\9\10\11
è	Parity	None\Even\Odd

è   Stop Bit   1\1.5\2

è   Stop Bit   1\1.5\2

H. COMMAND MENU

	è Command Mode	AT Command\V.25bis Command \I-Tek Mode\Dumb Mode
	è Result Form	Short\Long
	è Result Code	Off\On
	è Command Echo	Off\On
	è AT Prefix	On\Off
	è Escape Code	0...255
COMMAND :	è EOL Code	0...255
	è LF Code	0...255
	è Backspace Code	0...255
	è Escape Guard	0 ms...25500 ms
	è Framing	ASYNC\HDLC/SDLC \BI-SYNC\MONO-SYNC

If you select ASYNC, then the following menu tree will be shown as below:

è	Data Bit LEN.	5\6\7\8
è	Parity	None\Even\Odd
è	Stop Bit	1\1.5\2

If you select HDLC/SDLC, then the following menu tree will be shown as below:

è	Check Sum	None\CRC-CCITT
è	Addr Define	Global\User Define
è	Setup Addr	0...255 (Available for "User Define".)

If you select BI-SYNC, then the following menu tree will be shown as below:

è	Check Sum	None\CRC-16
è	Code Format	ASCII 8-N-1\EBCDIC 8-N-1 \ASCII 7-0-1
è	SYNC Define	Default Value\User Define
è	SYNC Char1	0...255 (Available for "User Define".)
è	SYNC Char2	0...255 (Available for "User Define".)

If you select MONO-SYNC, then the following menu tree will be shown as below:

è	Check Sum	None\CRC-16
è	Code Format	ASCII 8-N-1\EBCDIC 8-N-1 \ASCII 7-0-1
è	SYNC Define	Default Value\User Define
è	SYNC Char1	0...255 (Available for "User Define".)
è	SYNC Char2	0...255 (Available for "User Define".)

I. LINE SETUP MENU

	è	Line Type	Dial Line\2W Leased\4W Leased
	è	Leased To Dial	Manu\Auto
	è	L → D Timer	Forever\1 Minutes...255 Minutes
	è	Retrain Times	Disconnect only\1 Times...255 Times
	è	Backup Tel#1	#0...#9
LINE :	è	Backup Tel#2	None\#0...#9
SETUP	è	Backup Speed	Adapt\V34E 336\V34E 312\V34 288
			\V34 264\V34 240\V34 216\V34 192
			\V34 168\V34 144\V34 120\V34 96
			\V34 72\V34 48\V34 24 \V32t 192T
			\V32t 168T \V32b 144T\V32b 120T
			\V32 96T\V32 96\V32b 72T\V32 48
			\V33 144T\V33 120T\V33 96T\V33 72T
			\V33 48\V29 9600\V29 7200\V29 4800
			\V27 4800\V27 2400\V26 2400\V26 1200
			\V23 1200\V23 600\V22b 2400\V22 1200
			\BELL 212A\BELL 103\V21 300
			(depend on model)
	è	Dial To Dial	Off\On
	è	D → L Timer	Forever\1 Minutes...255 Minutes
	è	Dial To Leased	Manu\Auto
	è	Broken Discon	Off\On
	è	4w Echo Cancel	Off\On
	è	♣	Echo Canceller Short/Long
	è	✚	RTrip-HandShake Off\On
	è	V32b Fast-Train	Off\On

> **Note:** *The function with (✚) mark is only available for T-288C & ITM-3296bis.*
> *The function with (♣) mark is only available for T-1496 & T-1496terbo.*

J. PROFILE MENU

	è	Load	User Profiles #0...#9(#0...#1 Rack) (for T-288C & ITM-3296bis)
			\0:AS-DL-AT-NONE \1:AS-DL-AT-AUTO
			\2:SY-DL-V25-NONE \3:AS-2L-ANS-V34/32b
			\4:AS-2L-ORG-V34/32b \5:SY-2L-ANS-V34/32b
			\6:SY-2L-ORG-V34/32b \7:SY-4L-ANS-V34/32b
			\8:SY-4L-ORG-V34/32b \9:SY-4L-V33/V29
PROFILE :	è	Load	User Profiles #0...#9(#0...#1 Rack) (for T-1496 & T-1496terbo)
			\0:AS-DL-AT-NONE \1:AS-DL-AT-AUTO
			\2:SY-DL-V25-NONE \3:AS-2L-ANS-32b/32t
			\4:AS-2L-ORG-32b/32t \5:SY-2L-ANS-32b/32t
			\6:SY-2L-ORG-32b/32t \7:SY-4L-ANS-32b/32t
			\8:SY-4L-ORG-32b/32t \9:ASY-2L-ANS-REL
	è	Save	User Profiles#0...#9
	è➔	Password Edit	Enter:

è➜   Front Lock   Unlock\Lock

K. REMOTE STATUS MENU

	è		Tx Level	= -XX dBm
	è		Rx Level	= -XX dBm
	è		S/N. Ratio	= XX dB
	è		F-Shift	= X.X Hz
	è		F F-Shift	= X.X Hz
	è	*	Delay	= XXXX ms
REMOTE	è	*	N Echo	= XX.X dB
STATUS :	è	*	F Echo	= XX.X dB
	è		DTE	= XXXXX ASY 10
	è		Retrains	= XXXXX
	è	*/	RX Baud	= XXXX
	è	*/	TX Baud	= XXXX
	è	*/	RX Freq	= XXXX Hz
	è	*/	TX Freq	= XXXX Hz
	è	*/	TX PowerOff	= X dB
	è		TR(tr) MR(mr) RS(rs) CS(cs) CD(cd) T(t)	

Note1: *The function with asterisk mark (*) is only available for V.32 and above. The function with both (*) and (/) marks is only available for V.34.*

Note2: *The Secondary Channel shall be active (On) to enable the remote status function.*

3.5 Detailed Description of the menu tree

3.5.1 STATUS MENU

ITEM NAME	COMMAND	DESCRIPTION
TX LEVEL=-XX dBm	AT%S	Transmitted signal level. This value is equal to the " TX level" of config modem. Normally, for the 2w leased line and the dial line, the recommended value is between -7 and -10dBm. A higher level may create an interference. 4w leased line should be between 0 and -31dBm. It can be increased of in order to obtain a more satisfactory S/N ratio (siganl to noise ratio) by setting a higher level as possible, but a saturation of the active transmission equipment should be avoided. The Tx level level should be setting under -8dBm while to operating V.34 mode.
RX LEVEL=-XX dBm	AT%S	Received signal level. This value is the result of the line attenuation from the transmitted signal. Normally, the RX level of 2w leased line and the dial line is between -15 and -33dBm while the level of 4w leased line is between -10 and -26dBm.
S/N. RATIO=XX dB	AT%S	Signal to noise ratio. The bigger the S/N ratio, the better quality of a line is. A higher operating speed needs a higher S/N ratio. Normally, the S/N requirement of running 14400 bps should be more than 24 dB while to operate at 9600 bps, a S/N better than 20 dB is required.
F-SHIFT=X.X Hz	AT%S	Frequency-shift (offset). It is the shift of the carrier central frequency caused by the transmission link. This shift normally should be less than + / - 7 Hz. The smaller is better.
F F-SHIFT=X.X Hz	AT%S	Far end frequency-shift (offset). The frequency shift of the far end received carrier signal.It normally should be less than +/- 7 Hz. The smaller is better. The value will not accurate once level is too small from the remote site.
DELAY=XXXX ms	AT%S	Round trip delay time. This delay is caused by a round trip of a long distance line , especially in a satellite circuit. Usually, round trip of a satellite link shall create a time delay of 0.5 second (500ms). The modem will accept a maximum time delay of 1.5 seconds for V.34 mode, 2.1 sec for V.32/V.32bis (This value is provided only when operating on 2-wire of V.32 /V.32bis / V.34).

N ECHO=-XX.X dB	AT%S	Near end echo. This echo is caused when the near end line impedance is not matched. A smallest near end echo is always required. The normal near end echo level is between -6 dB and -20 dB (This value is provided only when operating on 2-wire of V32/V.32bis/V.34).
F ECHO=-XX.X dB	AT%S	Far end echo. This echo is caused when the far end line impedance is not matched. A smallest far end echo level is always required. Normally,the far end echo level is between -20 dB and -55 dB (This value is provided only when operating on 2-wire of V.32 / V.32bis / V.34).
DTE=XXXXX ASY 10	AT%S	Indication of speed and data format of DTE. For examples: DTE = 19200 ASY 10 stands for 19200 bps Asynchronous 10 bits in total bit length. DTE=14400 SYN means 14400 bps synchronous.
RETRAINS=XXXX		Total retrain count. From the total retrain count, you will find the total times of line interference occurred. This value will not be cleared automatically unless pressing the "ENTER" key or power off.
RX BAUD=XXXX	AT%S	Indication of the signalling rate of received signal. For examples: RX Baud=3429 means the switching speed or number of transitions is 3429, however, one baud can be made to represent more than one bit per second. (This value is only available when operating on V.34).
TX BAUD=XXXX	AT%S	Indication of the signalling rate of transmitted signal. (This value is only available when operating on V.34).
RX FREQ=XXXXHz	AT%S	Indication of the carrier frequency of received signal. For examples: RX Freq = 1959Hz means the unique frequency used to to "carry" data is 1959 Hz. (This value is only available when operating on V.34).
TX FREQ=XXXXHz	AT%S	Indication of the carrier frequency of transmitted signal. (This value is only available when operating on V.34).
TX POWEROFF=XdB	AT%S	Indication of a reduction of transmit power level. For examples: TX PowerOff = 6dB means the transmit power level is requested to reduce 6 dB by the remote modem. (This value is only available when operating on V.34).

3.5.2   DIAL MENU

ITEM NAME	COMMAND	DESCRIPTION
DIAL A NUMBER ç /**#0.......#9**	ATDSn	Dial out a preset telephone number #n(n=0..9). This function can interact with the auto redial function or dial line auto establishment function.
EDIT A NUMBER ç /**#0.......#9**	AT&Zn=xx	Edit telephone number #n (n=0..9) for 20 digits each group. If a telephone number is set the symbol of "@" and auto redial is ON, when place a call and can not get through,another group of telephone number will be dialed automatically until the telephone number without "@" is dialed and then it will return to the first group. Therefore a maximum of 10 groups of telephone number can be obtained for an intelligent redial function.
RING TIMES	ATS0=n	Auto answer activates when detected ring count = n (default=2). *If 108.1 (DTR ON Auto Dial/Ans) is used for auto answer, it must be set to OFF and the answer shall be activated by DTR provided by DTE (default value=2 times).
ç AUTO ANS OFF	ATS0=0	/Turn off the auto answer function.
ç 1..255 TIMES		/An auto answer will be given when bell rings 1..255 times.
WAIT FOR DIAL	ATS6=n	Time to wait for dial (default value=2 sec.).
ç IMMEDIATELY	ATS6=0	/Immdeiately .
ç 1..255 SECONDS		/1....255 sec.
DELAY OF ","	ATS8=n	Time delay when symbol "," is encountered during dialing (default value = 2 sec.).
ç IMMEDIATELY		/Immediately.
ç 1..255 SECONDS		/1....255 sec.
CALL TIMEOUT	ATS7=n	Time to wait for line connection after dialing (default value = 45 sec.).
ç FOREVER		/Forever.
ç 1..255 SEC.		/1....255 sec.

PROGRESS TONE	ATXn	Select if detect of busy tone or dial tone to proceed dialing.
ç BASIC CODE	ATX0	/Don't care any tone and do not show line connection speed.
ç DON'T CARE	ATX1	/Don't care busy tone and show line connection speed.
ç DIAL TONE	ATX2	/Don't care busy tone and show line connection speed.
ç BUSY TONE	ATX3	/Don't care dial tone and show line connection speed.
ç DIAL + BUSY TONE	ATX4	/Do care dial tone, busy tone and extended result code (default).
AUTO DIAL TEL#	ATS51=n	Select telephone number in DTR-ON auto dial mode (CCITT 108.1).
ç **#0...#9**	(bit 3....0)	
REDIAL DELAY	ATS44=n	Pause time between auto redial.
ç IMMEDIATELY	ATS44=0	*This setting is limited to more than 3 minutues in Taiwan and some other countries.
ç 1...255 MINUTES		/default=1 minute.
REDIAL TIMES	ATS38=n	Set times of redial.
ç DISABLE REDIAL	ATS38=0	/Disable auto redial function.
ç 1..255 TIMES		/255 times means to proceed redial until line is successfully connected.
DIAL TYPE		Select dial type.
ç PULSE	ATP	/Pulse dial (default).
ç TONE	ATT	/Tone (DTMF) dial.
108.1 ACTION		Select 108.1 action type.
ç FIXED ANS/ORG		/Fixed ANS/ORG (default).
ç AUTO BY RING		/Auto By Ring
LOGIN CHECK		Select call in security check function for dial-line application.
ç OFF		/Login check disable (default).
ç BY MODEM		/Login check by the presented telephone number stored on the modem device (#0 ~ #9).
ç BY NMS		/Login check by the Tainet Manager System.
SHORT ANS TONE		

ç 1.7 seconds / 2.3
  seconds / 3.0 seconds
ç off

/selections for quick connection to POS system

3.5.3   PROTOCOL MENU

ITEM NAME	COMMAND	DESCRIPTION
PROTOCOL TYPE	AT\Nn	Select error correction and data com-pression function for async mode only. *This setting is ineffective in sync mode. It will automatically become direct mode regardless of setting made once the link established.
ç DIRECT	AT\N0	/Without V.42/MNP function and speed conversion (DTE speed = modem speed).
ç NORMAL	AT\N1	/With DTE speed conversion but without error correction and data compression function. However, data flow control has to be active.
ç AUTO MNP/V42	AT\N2	/Automatically negotiate V.42/MNP level with remote mode.The priority sequence is V.42bis-V.42-MNP5-MNP4-Normal. However , data flow control has to be used.
ç RELIANT MNP/V42	AT\N3	/Link can be established only when both sides use V.42 / V.42bis or MNP4/5 simultaneously, must use data flow control.
MNP TYPE	ATS39=n	MNP level selection.
ç NONE	(bit3..0)	/Disable MNP.
ç MNP-4		/Use MNP level 1..4.
ç MNP-5		/Use MNP level 1..5 (default).
V42 DETECT	ATS42=n	Longest time to detect the V.42/V.42bis protocol in auto reliable mode.
/400 ms...1900 ms	(bit7..4)	/default = 1900 ms.
MNP BLOCK SIZE	AT\An	The largest block size in MNP mode.
ç 64	AT\A0	
ç 128	AT\A1	
ç 192	AT\A2	
ç 256	AT\A3	/(default).
BREAK OPTION	AT\Kn	Selection of handling method when break sequence received.
ç Break Option-0	AT\K0	/Expedited destructive.
ç Break Option-1	AT\K1	/Expedited non-destructive.
ç Break Option-2	AT\K2	/Queued (default).
ç Break Option-3	AT\K3	/Reserved. Don't use it now.

SEND ADP./ODP.	ATS40=n	During the process of V.42 protocol identification,a special fixed signal will be identified if V.42 protocol can be provided. But if the user be sure that the modem of both sides use or not use V.42, he may set to OFF so as to speed up the line connection. (default is ON).
ç OFF	(bit3)	
ç ON		
SIM. ENQ.	AT\Hn	Emulate ENQ/ACK in DTE pacing, normally used for the connection of HP Host and terminals. This function can be used together with DTE flow control or used alone.
ç NONE	AT\H0	/(default).
ç SIM. PERIPHRAL	AT\H1	/Use in connection with HP Host.
ç SIM. HOST	AT\H2	/Used in connection with HP terminal.
DISCON. METHOD	ATS40=n	Disconnect method for V.32/V.32bis/V.34.
ç IMMEDIATE	(bit2)	/Immediate disconnect.
ç WITH CLEAR-DOWN		/Send clear down before disconnection.
DCD-DCE FLOW	AT\Gn	To activate DCE-DCE flow control or not in normal mode.
ç OFF	AT\G0	/Disable. Normally, DCE-DCE flow control is not necessary unless DTE speed < modem speed (default).
ç ON	AT\G1	/Enable.
DCE INACTIVE	ATS43=n	Under V.42/MNP operation, if the dataflow is interrupted by any reason caused by DCE with duration longer than this set time period, modem will give up V.42/MNP and return to direct mode.(default = 1 minute).
ç FOREVER	(bit2...0)	
ç 1..7 MINUTES		
RESEND TIMES	ATS42=n	For a single block, modem will give up V.42/MNP and retrun to direct mode when resending times is more than this setting caused by any reasons. (default = forever).
ç FOREVER	(bit3...0)	
ç 12..180 TIMES		
FAST RESET	ATS32=n	Reset rate selection for ATZ and AT&F
ç NORMAL ATZ,AT&F	(bit0,1)	/(default)
ç FAST ATZ		
ç FAST AT&F		
ç FAST ATZ,AT&F		

XON/XOFF PASS	AT\Xn	When using XON/XOFF as data flow control in V.42/MNP/Normal mode, modem can choose to intercept XON/XOFF signal or have it be sent as data to the remote modem (default = OFF).
ç OFF	AT\X0	
ç ON	AT\X1	
CONNECT CODE	ATWn	Send back the V.42/MNP extended result code.
ç DTE SPEED	ATW0	/No sending back (default).
ç DTE/MOD/EC	ATW1	/Sending back extended result code 1.
ç DCE/ARQ/MOD/EC	ATW2	/Sending back extended result code 2.
V42 TYPE	ATS39=n	Select CCITT V.42 Mode.
ç NONE	(bit5..4)	/Disable V.42 function.
ç V42		/V.42 protocol.
ç V42bis		/V.42bis protocol.

3.5.4   TEST MENU

ITEM NAME	COMMAND	DESCRIPTION
CLEAR ALL	AT&T0	Clear all the tests in one time, and a statement "Has been done" shall be shown.
LAL ç ON ç OFF	AT&T1	Local analog loop test (ON/OFF).This test is normally used to certify if the modem is in normal operation condition. Also, this test is usually carried out together with B.E.R test.
RDL ç ON ç OFF	AT&T6	For remote digital loop test (ON/OFF). This test can control remote modem to executive digital loop for BER test to find out if the modem and line of both ends are in normal condition.
DL ç ON ç OFF	AT&T3	For digital loop test (ON/OFF). This test enable the received digital data demodulated and send back to match with the far end test.
RDL GRANT	AT&T4	Set for accepting remote digital loop(RDL) test.
ç ON		/Enable. (default).
ç OFF		/Disable.
MANU RETRAIN	ATO1	Forcing modem for retrain.
TEST TIMEOUT	ATS18=n	Set for test time duration.
ç FOREVER	ATS18=0	/Continuous.
ç 1..255 MINUTES		/1...255 MIN.
TP TYPE	AT%Tn	Test patterns selection (CCITT V.52 Rec.)
ç ALTER	AT%T0	/1010... alternative pattern (default).
ç 511	AT%T1	/"511" pattern.
ç 2047	AT%T2	/"2047" pattern (T-288C & ITM-3296bis only).
ERROR COUNT		Bit error count display function.
ç 0....2^{24} -1		Press Left or Right shift key to insert error. Press "ENTER" key to clear.
B.E.R. TEST	AT&T10	Set bit error rate test function.
ç ON		/Enable.
ç OFF		/Disable (default).

3.5.5   CONFIG MODEM MENU

ITEM NAME		COMMAND	DESCRIPTION
SPEED		AT%Gn	Set modem speed
ç ADAPTIVE		AT%G0	/Set modem speed to be adaptive (multi-standard hand-shaking) mode, connectable speed from V.34 / V.32b / V.32 / V.22bis / V.22 /V.21.
ç V34+	336	AT%G42	/Set speed to V34 Extended 33.6k bps...4DTCM
ç V34+	312	AT%G41	/Set speed to V34 Extended 31.2k bps...4DTCM
ç V34	288	AT%G28	/Set modem speed to V34 28800bps....4DTCM
ç V34	264	AT%G37	/Set modem speed to V34 26400bps....4DTCM
ç V34	240	AT%G27	/Set modem speed to V34 24000bps....4DTCM
ç V34	216	AT%G36	/Set modem speed to V34 21600bps....4DTCM
ç V34	192	AT%G26	/Set modem speed to V34 19200bps....4DTCM
ç V34	168	AT%G35	/Set modem speed to V34 16800bps....4DTCM
ç V34	144	AT%G34	/Set modem speed to V34 14400bps....4DTCM
ç V34	120	AT%G38	/Set modem speed to V34 12000bps....4DTCM
ç V34	96	AT%G33	/Set modem speed to V34 9600bps....4DTCM
ç V34	72	AT%G32	/Set modem speed to V34 7200bps....4DTCM
ç V34	48	AT%G31	/Set modem speed to V34 4800bps....4DTCM
ç V34	24	AT%G40	/Set modem speed to V34 2400bps....4DTCM
ç V32t	192	AT%G30	/Set modem speed to V.32t 19200 bps TCM.
ç V32t	168	AT%G29	/Set modem speed to V.32t 16800 bps TCM.
ç V33	144T	AT%G25	/Set modem speed to V.33 14400 bps TCM.
ç V33	120T	AT%G24	/Set modem speed to V.33 12000 bps TCM.
ç V33	96T	AT%G23	/Set modem speed to V.33 9600 bps TCM.
ç V33	72T	AT%G22	/Set modem speed to V.33 7200 bps TCM.
ç V33	48	AT%G21	/Set modem speed to V.33 4800 bps QAM.
ç V32b	144T	AT%G20	/Set modem speed to V.32bis 14400 bps TCM.
ç V32b	120T	AT%G19	/Set modem speed to V.32bis 12000 bps TCM.
ç V32	96T	AT%G18	/Set modem speed to V.32 9600 bps TCM.
ç V32	96	AT%G17	/Set modem speed to V.32 9600 bps QAM.
ç V32b	72T	AT%G16	/Set modem speed to V.32 7200 bps TCM.

ç V32	48	AT%G15	/Set modem speed to V.32 4800 bps QAM.
ç V29	9600	AT%G14	/Set modem speed to V.29 9600 bps QAM.
ç V29	7200	AT%G13	/Set modem speed to V.29 7200 bps DPSK.
ç V29	4800	AT%G12	/Set modem speed to V.29 4800 bps DPSK.
ç V27	4800	AT%G11	/Set modem speed to V.27bis 4800 bps DPSK.
ç V27	2400	AT%G10	/Set modem speed to V.27bis 2400 bps DPSK.
ç V26	2400	AT%G9	/Set modem speed to V.26 2400 bps DPSK.
ç V26	1200	AT%G8	/Set modem speed to V.26 1200 bps DPSK.
ç V23	1200	AT%G7	/Set modem speed to V.23 1200 bps FSK.
ç V23	600	AT%G6	/Set modem speed to V.23 600 bps FSK.
ç V22b	2400	AT%G5	/Set modem speed to V.22bis 2400 bps QAM.
ç V22	1200	AT%G3	/Set modem speed to V.22 1200 bps DPSK.
ç V21	300	AT%G1	/Set modem speed to V.21 300 bps FSK.
ç BELL	212A	AT%G4	/Set modem speed to BELL 212A 1200 bps DPSK.
ç BELL	103	AT%G2	/Set modem speed to BELL 103 300 bps FSK.
ORG/ANS MODE		ATS14=n	Set modem as the originate or answer mode.
ç ORIGINATE MODE ç ANSWER MODE		(bit7)	/For V.34/ V.32/ V.32bis/ V.22bis/ V.22/ V.21/ V.23 / BELL-212A / BELL103 in 2/4-wire FDX operation. It must be set in different mode on each side.
AUTO RETRAIN		AT%En	The automatic adaptive equalizer can be re-adjusted via retrain procedure activated automatically when the S/N become worse than the preset threshold.
ç ON (FAST)		AT%E0	/High sensitivity, retrain occurs according to S/N ratio.
ç OFF (SLOW)		AT%E1	/Low sensitivity, retrain occurs according to S/N ratio.
TX CLOCK		AT&Xn	Select transmit clock source.
ç INTERNAL		AT&X0	/Internal clock source, for most point to point application.
ç EXTERNAL		AT&X1	/External clock source, for cascade and TDM/STDM network application.
ç LOOPBACK		AT&X2	/Received clock source, for used in slave side of polling nerworks or the modem in the most far end of a cascading network.

COMPROMISE EQ.	ATS24=n	Select additional fixed equalizer at transmit side.
ç NONE	(bit3..2)	/Disable, compromise EQ is not necessary for normal transmission line as the auto adaptive equalizer at the receiving end can completely compensate.
ç CABLE		/Cable equalization function. Used for a practical line with very long distance (for T-288C and ITM-3296bis only).
ç 0\4\8\12dB		/Cable equalization function. Used for a practical line with very long distance (for T-1496 and T-1496terbo only)
ç M1040 LINE		/M1040 equalizer function. This normally used for a poor line to improve the line transmission quality (for T-288C and ITM-3296bis only).
DCD ON TIME	ATS9=n	Time period used to detect a real DCD sugnal. Carrier can be confirmed only when it continuously presents longer than the set time to avoid incorrect judgement caused by transient interference (default = 0.6 seconds).
ç 0..25500ms		/0.1...25.5 sec.
DCD OFF TIME	ATS10=n	Time period to determine a interrupt carrier to drop off DCD to aboid unnecessary line disconnection caused by transient interference. /Default for V.34 / V.32bis / V.32=15sec, for V.22bis=1.5 sec, for V.29/V.33=5 sec.
ç 0..25500 ms		/For V.34,V.33,V.32b,V.32,V.29,V.27bis,V.26
ç 0..25500 ms		/For V.22bis,V.22,V.21,V.23,BELL103,212A.
CALLING TONE	ATS14=n	Send calling tone or not.
ç ON	(bit0)	/Send calling tone.
ç OFF		/Not send (default).
V22 GUARD TONE	AT&Gn	Set for V.22 guard tone.
ç NONE	AT&G0	/Guard tone off (default).
ç 550 Hz	AT&G1	/Send out 550 Hz guard tone.
ç 1800 Hz	AT&G2	/Send out 1800 Hz guard tone.
ADAPT MODE SEL	AT%Mn	Multi-standard handshaking mode select.
ç V.100	AT%M0	/Select CCITT V100 mode (for T-288C and ITM-3296bis only).
ç V.32bis ANNEX	AT%M1	/Select CCITT V.32bis ANNEX mode (default).

DYNAMIC RANGE	ATS40=n	Set receive dynamic range.
ç +4..-33dBm	(bit7..6)	/for T-1496 & T-1496terbo.
ç -4..-43dBm		/for T-1496 & T-1496terbo (default).
ç +3..-26 dBm		/for T-288C & ITM-3296bis (V.33/V.29 default).
ç -6..-33 dBm		/for T-288C & ITM-3296bis.
ç -6..-43 dBm		/for T-288C & ITM-3296bis (V.34/V.32bis/V.32 /V.22bis/V.22/V.21/V.23 default)
ç +3..-40 dBm		/for T-288C & ITM-3296bis.
LL TX LEVEL	AT%Ln	Set leased line transmit level.(TXL)
ç 0..-31 dBm		/default TXL= -8 dBm for 4w L-L. TXL= -10 dBm for 2w L-L.
DL TX LEVEL	ATS30=n	Set dial line transmit Level, 0..-15 dBm.
ç 0..-15 dBm	(bit7..5)	/(default = -10 dBm).
POWER BACKOFF	ATS43=n	In V.34 operating mode, the remote modem may request reduction in the transmit power level (power backoff) when a significant amount of non-liner distortion is detected during line probing.
ç ON	(bit3)	/Enable
ç OFF		/Disable (default).
PRE-CODING	ATS45=n	In V.34 operating mode, precoding will remove the effect of noise enhancement in the modem receive equalizers on lines with attenuation distortion.
ç ON	(bit0)	/Enable
ç OFF		/Disable (default).
REMOTE CONFIG		Only available when connected and Secondary CH. is on.
ç S-REG N=XX		/read or set remote modem's S-register.
ç LOAD		/Command remote modem to load profile.
ç SAVE		/Command remote modem to save profile.

3.5.6   AUXILIARY MENU

ITEM NAME	COMMAND	DESCRIPTION
SPK. CONTROL	ATMn	Monitoring speaker switch control.
ç UNTIL DCD ON	ATM1	/Speaker turn on until DCD ON,then turn off (default).
ç ALWAYS ON	ATM2	/Keep speaker always on.
ç OFF WHEN DIAL	ATM3	/Turn on speaker after dialing is completed, and then detect until to find out carrier and then turn off speaker.
ç OFF	ATM0	/Keep speaker always off.
SPK. VOLUME	ATLn	Speaker vloume control.
ç LOW	ATL0,1	/Set speaker volume to low (default).
ç MEDIUM	ATL2	/Set to medium.
ç HIGH	ATL3	/Set to high.
AUTO FB/FF	ATS24=n (Bit5..4)	The modem continuously monitors the S/N ratio of the telephone line, then fallback or fall forward data rate automatically when the S/N ratio lower or higher.
ç ON	(bit0)	/Enable
ç OFF		/Disable (default).
SIGNAL MONITOR	ATS24=n (bit5..4)	Reserved. (Auto FB/FF ¦Û˚Êª@-˚³t)
ç 0\1\2\3 dB		/Cable equalization function. (Fine Tune)
SEND BREAK	AT\Bn	Send break sequence before line disconnection.
ç OFF	AT\B0	/No sending (default).
ç ON	AT\B1	/Sending.
LONG SPACE OFF	ATYn	Select auto disconnection option when long space signal received.
ç ON	ATY1	/Enable.
ç OFF	ATY0	/Disable (default).
ASI OVERSPEED	AT%An	Select async data speed tolerance.(ITU-T V.14)
ç +1%	AT%A0	/Basic range +1% to -2.5% (default).
ç +2.3%	AT%A1	/Extended overspeed range +2.3% to -2.5%.
V32/V33 96T THR	ATS46=n	Set V.32bis/V.33 9600 TCM auto retrain threshold. Decreasing this value if the line is seriously interfered. If the setting is below 10 dB, it means this speed is not used.
ç 0...49dB		/(default = 16 dB).

120T/96 THR	ATS47=n	Set V.32bis/V.33 12000 TCM & V.32 9600 QAM mode retrain threshold.
ç 0...49 dB		/(default = 18 dB).
V32/V33 72T THR	ATS59=n	Set V.32bis/V.33 7200 TCM retrain threshold.
ç 0...49 dB		/(default = 15 dB).
V32/V33 48Q SNR THR	ATS48=n	Set V.32/V.33 4800 QAM retrain threshold.
ç 0...49 dB		/(default = 13 dB).
V29/V22 96/24Q SNR TH	ATS49=n	Set V.29 9600 & V.22bis 2400 retrain threshold.
ç 0...49 dB		/(default = 16 dB).
V34 144T SNR THR	ATS56=n	Set V.32bis/V.33 14400 TCM and V.34 4DTCM retrain threshold. /(default = 25 dB).
ç 0...49 dB		
V29 72 THR	ATS57=n	Set V.29 7200 DPSK retrain threshold. (for T-288C & ITM-3296bis only)
ç 0...49dB		/(default = 15 dB).
TCM STATE	ATS58=n (bit4..3)	Set trellies code state. (for T-288C V.34 only)
ç 16		/16 trellies code (default).
ç 32		/32 trellies code.
ç 64		/64 trellies code.
DL CHECK TIME	ATS58=n	Set for Dial Tone Detect time duration. (for T-1496 & T-1496terbo only).
ç FOREVER	ATS58=0	/Continuous.
ç 1..255 MINUTES		/1...255 MIN.
ECHO PROTECT	ATS29=n	V.26/V.27ter 2-wire half-duplex mode echo protection.
ç OFF	(bit6)	/Disable (default).
ç ON		/Enable.
RDL BY 140	ATS29=n	DTE control RDL through EIA pin 21.
ç OFF	(bit2)	/Disable (default).
ç ON		/Enable.
AL BY 141	ATS29=n	DTE control AL through EIA pin 18.
ç OFF	(bit3)	/Disable. (default).
ç ON		/Enable.

V34 BAUD RATE	ATS23=n	Selection of V.34 symbol rate and bit rate.
ç 3429	(bit6..4)	/Select 3429 baud only. V34 24 bit rate can not be used. (default)
ç 3200		/Select 3200 baud only. V34 336, 24 bit rate can not be used.
ç 3000		/Select 3000 baud only. V34 336, 312, 24 bit rate can not be used.
ç 2743		/Select 2743 baud only. V34 336, 312, 288, 24 bit rate can not be used.
ç 2400		/Select 2400 baud only. V34 336, 312, 288, 264, 240 bit rate can not be used.
MAKE/BREAK	AT&Pn	Pulse dial make / break ratio selection.
ç UK (33.3%)	AT&P1	/33.3\66.7% (default).
ç US (39%)	AT&P0	/39\61%.
RING OFF TIME	ATS54=n	Ring off time. Modem needs to know the ring interval of the switching system at the remote
ç 0..15 SECONDS		location. So as to correctly judge that the answering modem pick-up the call or not. *ATDnnnnn = mmm can be used only when the value is correctly set. (default = 2 sec).
CALL-BACK	ATS45=n	Auto call-back security function.
ç OFF	(bit6)	/Disable (default).
ç ON		/Enable.
CALL-BACK TIME	ATS53=n	Set time waiting for auto call-back.
ç IMMEDIATELY		
ç 1...255 SECONDS		/(default = 15 sec).
CALL-BACK TEL#	ATS51=n	Phone no. setting for auto call-back function.
ç #0...#9	(bit7..4)	/Group #0 - #9.
DTMF DURATION	ATS11=n	DTMF dial duration and interval
ç 0...255 ms		/(default = 72 ms)
BACKLIGHT	ATS45=n	LCD backlight display & screen change control.
ç ON	(bit2..1)	/Always on.
ç OFF		/Always off and screen changes due to dialing or any change or new status of the link.
ç AUTO		/Backlight is off and LCD display to show the main manu if no operation within 5 minutes. It lights when pressing any key, or the link status changes. Besides, at the same time, the display show the new status of the link. The backlight shall keep on and not off automatically in test mode (default).

REMOTE GRANT	ATS24=n	Set if accept remote control or not.
ç OFF	(bit6)	/Not accept.
ç ON		/Accept(default) *RDL must also be set to ON to accomplish the remote control function.
SPK. MONITOR	ATS41=n	Speaker monitor selection.
ç RX	(bit5)	/Monitor RX signal (default).
ç RX+TX		/Monitor both RX & TX signal.
CTRL CARRIER	AST21=n	Control carrier selection.
ç OFF	(bit7)	/Disable (default).
ç ON		/Enable
JITTER FILTER	ATS29=n	50/100/150 or 60/120/180Hz jitter filter selection (for T-288C and ITM-3296bis only)
ç 50Hz	(bit0)	/Enable 50/100/150Hz jitter filter
ç 60Hz		/Enable 60/120/180Hz jitter filter(default)
AUTO FB/FF	ATS24=n	The modem continuously monitors the S/N ratio of the telephone line, then fallback or fall forward data rate automatically when the S/N ratio lower or higher than retrain threshold value.
ç ON	(bit4)	/Enable.
ç OFF		/Disable (default).
SECONDARY CH.	ATS29=n	A secondary channel is provided in high speed and V.34/V.32bis/V.32 modes, at data rate of 28.8kbps, 19.2kbps, 14.4kbps, 9.6kbps and 4.8kbps. The data rate of this secondary channel is 300bps, full duplex. The data format is asynchronous only, with 8 data bits, no parity, one start bit and one stop bit. After change this option, you shall re-connect the communication channel to enable your setting.
ç ON	(bit4)	/Enable.
ç OFF		/Disable (default).

TX WARPING	ATS58=n	Non-linear encoding, in V.34 operating mode, increase separation of high power points of the transmitted signal to improve performance of PCM circuit.
ç ON	(bit7)	/Enable.
ç OFF		/Disable (default).
CONSTELLATION	ATS58=n	Constellation expansion, in V.34 operating mode, add redundant higer amplitude points to the constellation to reduce the average transmitted signal power.
ç Normal	(bit6)	/Disable (default).
ç Expansion		/Enable

3.5.7   CONFIG DTE MENU

ITEM NAME	COMMAND	DESCRIPTION
DTE SPEED	ATxxxxx	This setting is used to determine DTE speed when auto speed conversion is ON in V.42 / MNP / normal mode.
ç 300bps	("xxxxx" =	
ç 600bps	DTE Speed)	
ç 1200bps		*When using direct mode and all the synchronous modes, this setting will not available and DTE speed will be determined by modem speed, DTE speed = modem speed.
ç 1800bps		
ç 2400bps		
ç 3600bps		
ç 4800bps		*The throughput is improved by using data compression,enhance this set higher than the modem speed is suggested to enable more effective operation.
ç 7200bps		
ç 9600bps		
ç 12000bps		*When use "AT" command and auto baud rate detect function"ON",this setting will be replaced by identified speed.
ç 14400bps		
ç 16800bps		
ç 19200bps		*Auto baud rate detect function can be offered up to 38400 bps only. (115.2k for new version T-288C/NC)
ç 21600bps		
ç 24000bps		
ç 26400bps		/Default = 9600 bps.
ç 28800bps		
ç 31200bps		
ç 33600bps		
ç 38400bps		
ç 57600bps		
ç 76800bps		
ç 115200bps		
FLOW CONTROL	AT\Qn	Used to set flow control between terminal and modem when using V.42/MNP and normal mode (asynchronous mode only).
		*Another ENQ/ACK control can be used with one of the following (see PROTOCOL MENU) for control code in HP network.
ç OFF	AT\Q0	/No flow control (default).
ç X-ON, X-OFF	AT\Q1	/Software control, used in text data.
ç RTS/CTS	AT\Q2	/Hardware control, bilateral, accept any type of data.
ç CTS ONLY	AT\Q3	/Hardware control identical to RTS/CTS control, but modem send the data in spite of RTS from DTE, unilateral control.
DTR CTL 108	AT%Dn	Modem action select for DTR from OFF to ON.

ç NORMAL	AT%D0	/Same as V.25 108.2 DTR operation (default).
ç AUTO DIAL/ANS	AT%D1	/Same as V.25/V.25bis 108.1 DTR operation. When DTR is from OFF to ON,the modems will dial (see DIAL MENU-AUTO dial tel#) and answer (Note the ring times in dial manu must be set to AUTO ANS OFF).
DTR OFF ACTION	AT&Dn	On originate and answer site respectively modem action select for DTR from ON to OFF.
ç FORCE ON	AT&D0	/Force DTR in ON position (default). A power-on auto dial operation can be achieved when operating with DTR ON auto dial.
ç COMMAND MODE	AT&D1	/Return to command mode.
ç DISCONNECT	AT&D2	/Disconnect. Normally used with 108.1.
ç MODEM RESET	AT&D3	/For Modem reset.
DSR CONTROL	AT&Sn	DSR signal control selection.
ç NORMAL	AT&S1	/DSR ON after Modem handshaking.
ç FORCED ON	AT&S0	/Force DSR in ON position.
DCD CONTROL	AT&Cn	DCD signal control selection.
ç FORCE ON	AT&C0	/Forece DCD in ON position.
ç NORMAL	AT&C1	/DCD ON means line is in connection while DCD OFF means line is OFF.
ç V.13 HDX	AT&C2	/CCITT V.13 standard simulated carrier in half-duplex.
ç PSEUDO HDX	AT&C3	/When data continuously receive all one's more than 24 bits or when line is disconnected, drop DCD to operate as simulated HDX control carrier.This is normally used in IBM SNA Polling networks.
RTS CONTROL	AT&Rn	RTS signal control selection.
ç NORMAL	AT&R0	/Controlled by DTE.
ç FORCED ON	AT&R1	/Keep RTS in ON position.
RTS/CTS DELAY	ATS26=n	Delay time from RTS-ON to CTS-ON. Usually used in cascade application (default=0).
ç 0..2550 ms	(bit0..7)	/0-2.5 seconds.

DTR DROP TIME	ATS25=n	Detect the time for DTR from ON to OFF (default = 0ms).
ç 0...1500 ms	(bit3...0)	/0-1.5 seconds.
DATA FORMAT	AT&Mn	Data format selection in data mode.
ç SYNC	AT&M1	/Sync.
ç ASYNC	AT&M0	/Async.
CTS CONTROL	ATS41=n	CTS operation type selection.
ç FOLLOW CCITT	(bit3)	/CTS goes off when in handshaking/retrain/RTS off and unable to transmit data.
ç FOLLOW EIA		/CTS will be OFF only when RTS is OFF.
DTR RISE TIME	ATS25=n	Detect the time for DTR from OFF to ON (default = 0ms).
ç 0...1500 ms	(bit7...4)	/0-1.5 seconds.
OH BY DTR	ATS32=n	Off-Hook for DTR off more than 5 sec.
ç ON	(bit2)	/Enable
ç OFF		/Disable (default).
TOTAL BITS		Total bit length for async data format (default=10).
ç 8		/Total bit length includes start, stop, parity and data bits. (default = 10)
ç 9		
ç 10		
ç 11		
PARITY		Set parity bit.
ç NONE		/None parity bit (default).
ç EVEN		/Even parity.
ç ODD		/Odd parity.
STOP BIT		Set stop bit.
ç 1		/1 stop bit (default).
ç 1.5		/1.5 stop bits.
ç 2		/2 stop bits.

3.5.8   COMMAND MENU

ITEM NAME	COMMAND	DESCRIPTION
COMMAND MODE	ATS45=n	Intelligent function command set selection.
ç AT COMMAND	(bit4..3)	/Hayes compatible "AT" command set with async/sync (Bisync or Monosync) and HDLC formats.
ç V.25bis COMMAND		/CCITT V.25bis command set with async/sync (Bisync or Monosync) and HDLC formats.
ç I-TEK MODE		/TAINET proprietary command set.
ç DUMB MODE		/Dumb mode, don't accept any command. This mode is set for all leased line and most of the sync dial line to prevent modem from interference made by the data of the terminal, and protect the terminal against any malfunction caused by the return result code from the modem.
RESULT FORM	ATVn	AT command result code format select.
ç SHORT	ATV0	/short form-digits.
ç LONG	ATV1	/long form-words (default).
RESULT CODE	ATQn	AT command result code control.
v OFF	ATQ1	/Do not send result code.
ç ON	ATQ0	/Send result code (default).
COMMAND ECHO	ATEn	AT command echo return control.
ç OFF	ATE0	/Do not return command echo.
ç ON	ATE1	/Return command echo (default).
"AT" PREFIX	AT%Un	Auto baud rate detection function control. *This function can detect 300-38400 bps.
ç ON	AT%U1	/Enable (default).
ç OFF	AT%U0	/Disable.
ESCAPE CODE	ATS2=n	Set escape code for data mode.
ç 0...255		/(default value = 43) "+".
EOL CODE	ATS3=n	Set "end-of-line" (ENTER) code.
ç 0...255		/(default value = 13).
LF CODE	ATS4=n	Set line-feed code.
ç 0...255		/(default value = 10).

BACKSPACE CODE	ATS5=n	Set backspace code.
ç 0...255		/(default value = 8).
ESCAPE GUARD	ATS12=n	Set time interval for escape code.
ç 10...2550 ms		/(default value =1400 ms).
FRAMING	ATS17=n	Command data format.
ç ASYNC	(bit1..0)	/Async (default).
ç HDLC/SDLC		/HDLC(SDLC).
ç BI-SYNC		/Bisync.
ç MONO-SYNC		/Monosync.

The following setup is only avlailable for ASYNC selection.

DATA BIT LEN.	ATS15=n	Async data bit length.
ç 5	(bit3..2)	/5 bits.
ç 6		/6 bits.
ç 7		/7 bits.
ç 8		/8 bits (default).
PARITY	ATS15=n	Async format parity bit.
ç NONE	(bit5..4)	/None parity.
ç EVEN		/Even parity.
ç ODD		/Odd parity.
STOP BIT	ATS15=n	Async format stop bit.
ç 1	(bit1..0)	/1 stop bit (default).
ç 1.5		/1.5 stop bits.
ç 2		/2 stop bits.

The following setup is only avlailable for HDL/SDLC selection.

CHECK SUM   Selection of the frame check sum.

ç NONE

ç CRC-CCITT

ADDR DEFINE   Selection of the address of the modem.

ç Global

ç User Define

SETUP ADDR   Definition of the address of the user. It's only
                                                          available for "User Define".

ç 0...255

The following setup is avlailable for both BI-SYNC and MONO-SYNC selection.

CHECK SUM   Selection of the frame check sum.

ç NONE

ç CRC-16

CODE FORMAT   Selection of the data format.

ç ASCII 8-N-1

ç EBCDIC 8-N-1

ç ASCII 7-0-1

SYNC DEFINE   Definition of the SYNC character.

ç Default Value

ç User Define

SYNC CHAR1   Definition of the SYNC character 1. It's only
                                                          available for "User Define".

ç 0...255

SYNC CHAR2   Definition of the SYNC character 2. It's only
                                                          available for "User Define".

ç 0...255

3.5.9 LINE SETUP MENU

ITEM NAME	COMMAND	DESCRIPTION
LINE TYPE		Select line type and also set dial back-up function.
ç DIAL LINE	AT&L0	/Dial line.
ç 2W LEASED LINE	AT&L1	/2 wire leased line.
ç 4W LEASED LINE	AT&L2	/4 wire leased line.
LEASED TO DIAL	ATS27=n	Auto dial back-up control while leased line is out of service.
ç MANU	(bit6)	/Manual control dial back-up (default).
ç AUTO		/Auto dial back-up.
L → D TIMER	ATS36=n	Time period which allows the determination to force the leased line been disconnected when too much retrain occurred
ç FOREVER		within the period set.
ç 1...255 MINUTES		/(factory set at 5 minutes).
RETRAIN TIMES	ATS37=n	Count limit of the retrain times to determine line disconnection (default=10).
ç DISCONNECT ONLY		Within the set period of L → D timer,once the counts of retrain times is more than
ç 1...255 TIMES		the default value, the line will be disconnected.
BACK-UP TEL#1	ATS50=n	Select the stored phone numbers in the first group of auto back-up dial.
ç #0..#9	(bit3..0)	/#0..#9
BACK-UP TEL#2	ATS50=n	Select the stored phone numbers in the second group of auto back-up dial.
ç NONE	(bit7..4)	
ç #0..#9		
BACKUP SPEED	ATS55=n	Select modem speed used in the auto dial back-up mode.
ç Adapt...V21 300		/(default = V.34 288).

DIAL TO DIAL	ATS41=n	When dial line is in use (excluding dial back-up mode). The line can be restored by auto-redial after line disconnection.
ç OFF	(bit7)	/Disable (default).
ç ON		/Any abnormal line disconnection shall automatically redial to reconnect and provide similar leased line function through dial line.
D → L TIMER	ATS28=n	When operate in dial back-up mode, to select how long it will take to detect if the leased line is recovered or not.
ç FOREVER		
ç 1..255 MINUTES		/(default = 60 min.)
DIAL TO LEASED	ATS27=n	Select whether return to leased line automatically or not during dial back-up mode.
ç MANU	(bit7)	/Manual control (default).
ç AUTO		/Return to the leased line automatically when leased line is recovered.
BROKEN DISCON.	ATS43 = n	Broken line detection feature
ç OFF	(bit 4)	/Disable (default)
ç ON		/Enable
4W ECHO CANCEL	ATS43 = n	Echo Canceler will be still active in 4w application of V.32/V.32b/V.34
ç OFF	(bit 5)	/Disable (default).
ç ON		/Enable.
RTRIP-HANDSHAKE	ATS43 = n	Round Trip Delay handshaking (for T-288C & ITM-3296bis only).
ç OFF	(bit 6)	/Disable.
ç ON		/Enable (default).
ECHO CANCELER	ATS43 = n	Two choice of echo cancelers are provided (for T-1496 & T-1496terbo only).
ç SHORT CANCELER		/Standard version (default).
ç LONG CANCELER	(bit 6)	/Longer ver. (for round-trip delay >36.833 ms).
V32b FAST-TRAIN	ATS43 = n	Training sequence selection forV.34/V.32b/V.32
ç OFF	(bit 7)	/Normal Training Sequence (default)
ç ON		/Fast Training Sequence

3.5.10 PROFILE MENU

ITEM NAME	COMMAND	DESCRIPTION
LOAD		This machine provides 20 groups of load configuration profile. Among them 10 groups configuration profile which cover the most required applications for normal use. The other 10 groups are set by the user which can be revised by the user before filing for use.
/USER PROFILES#0..9	AT&YnZn	/User defined load profile #0..#9. Through this operation, required settings can be made for the next operation when the modem is power on.
FACTORY PROFILES	AT&Fn	Load factory profile #0..#9.
/#0 AS-DL-AT-NONE	AT&F0	/Async, dial line, AT command,direct mode and V32 Adapt, this is a typical operating mode for Hayes compatible modem (default).
/#1 AS-DL-AT-AUTO	AT&F1	/Async, dial line, AT command, Auto reliable mode, V32 Adapt, this mode is most applicable to BBS networks.
/#2 SY-DL-V25-NONE	AT&F2	/Sync, dial line, V.25bis command, V32 Adapt, this mode is applicable to IBM AS-400 series sync dial networks.
/#3 AS-2L-ANS-V34/32b/32t	AT&F3	/Async, 2W leased line, answer, applicable to the most of the async, non-compressed 2 wire leased line. (V.34 288 is for T-288C only)
/#4 AS-2L-ORG-V34/32b/32t	AT&F4	/Async, 2W leased line, originate, applicable to the most of the Async, non-compressed 2 wire leased line. (V.34 288 is for T-288C only)
/#5 SY-2L-ANS-V34/32b/32t	AT&F5	/Sync, 2W leased, answer, applicable to the most of the Sync, 2 wire leased line. (V.34 288 is for T-288C only)
/#6 SY-2L-ORG-V34/32b/32t	AT&F6	/Sync, 2W leased line, originate, applicable to the most of the Syne, 2 wire leased line. (V.34 288 is for T-288C only)
/#7 SY-4L-ANS-V34/32b/32t	AT&F7	Sync, 4W leased line, answer, applicable to the most of the Sync, 4 wire leased line. (V.34 288 is for T-288C only)
/#8 SY-4L-ORG-V34/32b/32t	AT&F8	/Sync, 4W leased line, originate, applicable to the most of the Sync, 4 wire leased line. (V.34 288 is for T-288C only)
/#9 SY-4L-V33/V29	AT&F9	/Sync, 4W leased line, applicable to V.33/ V.29/ V.27b/ V.26 traditional 4 wire leased line. (for T-288C and ITM-3296bis only)
/#9 ASY-2L-ANS-REL		/Async, 2W leased line, answer, adaptive speed, reliable mode and NMP5. (for T-1496/T-1496t)

SAVE	AT&Wn	Store the revised configuration in the user-defined configuration profile.
/USER PROFILES#0..9		/Store in the nth group in the user's configuration profile. Usually, the 0th group is provided for the working area, setting store in this area or load the factory default will change the set parameters for next power-on operation. If you want the nth group is to be used for the next power-on working profile, operate the load user profile #n.
FRONT LOCK		Front panel lock control.
/UNLOCK		/No limitation for any front panel operation (default).
/LOCK		/Can view the status and current setting of the modem,but can not make any changes of setting.
PASSWORD EDIT		For changing password, use left key-L, right key-R, enter key-E, exit key-X, VO/DA key-V.
/ENTER:_ _ _ _		The password by the factory are"REEE" (right moving key, ENTER, ENTER, ENTER). The global password "XVRE" is effective permanently,and can be used if you forget the revised password.

3.5.11 REMOTE STATUS MENU

ITEM NAME	COMMAND	DESCRIPTION
TX LEVEL=-XX dBm	AT%S	Transmitted signal level of the remot modem.
RX LEVEL=-XX dBm	AT%S	Received signal level of the remot modem.
S/N. RATIO=XX dB	AT%S	Signal to noise ratio of the remot modem.
F-SHIFT=X.X Hz	AT%S	Frequency-shift (offset) of the remot modem
F F-SHIFT=X.X Hz	AT%S	Far end frequency-shift (offset) of the remot modem.
DELAY=XXXX ms	AT%S	Round trip delay time of the remot modem (This value is provided only when operating on 2-wire of V32/V.32bis/V.34).
N ECHO=-XX.X dB	AT%S	Near end echo of the remot modem (This value is provided only when operating on 2-wire of V32/V.32bis/V.34).
F ECHO=-XX.X dB	AT%S	Far end echo of the remot modem. (This value is provided only when operating on 2-wire of V.32 / V.32bis / V.34).
DTE=XXXXX ASY 10	AT%S	Indication of speed and data format of DTE of the remot modem.
RETRAINS=XXXX		Total retrain count of the remot modem.
RX BAUD=XXXX	AT%S	Indication of the signalling rate of received signal of the remot modem. (For V.34 only.)
TX BAUD=XXXX	AT%S	Indication of the signalling rate of transmitted signal of the remot modem. . (For V.34 only.)
RX FREQ=XXXXHz	AT%S	Indication of the carrier frequency of received signal of the remot modem. (For V.34 only.)
TX FREQ=XXXXHz	AT%S	Indication of the carrier frequency of transmitted signal of the remot modem. (For V.34 only.)
TX POWEROFF=XdB	AT%S	Indication of a reduction of transmit power level of the remot modem. (For V.34 only.)
TR MR RS CS CD T **(tr mr rs cs cd t)**		LED Indication of of the remot modem, as illustrated below. TR-DTR On tr-DTR Off. MR-DSR On. mr-DSR Off. RS-RTS On. rs-RTS Off. CS-CTS On. cs-CTS Off. CD-DCD On. cd-DCD Off. T-TST On. t-TST Off.

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CONTENT

CHAPTER 4 :   GENERAL INFORMATION AND FEATURES

4.1 Preview

In order to help you to get familiar with your TAINET Network Series Modem, this chapter introduces you some common applications. For most applications, the materials of this chapter will be enough.

4.2 Dial Line VS. Leased Line

There are two kinds of telephone lines --- dial lines and leased lines described as below.

A. Leased line provides users a dedicated communication channel. Both ends of the circuit are permanent. It offers continuous service and provides absolute security. It will not be invaded by any other circuit Due to the dedication, it supports better quality and higher reliability.
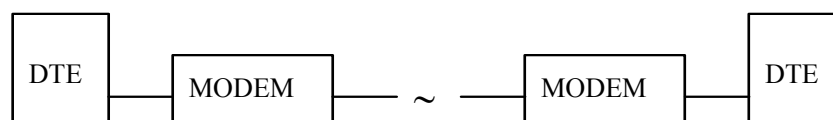
FIG. 4-1: Leased Line

B. Before using a dial line such as the circuits for telephone and facsimile machine, we have to dial a number. For the users who are used to communicate with different counterparts such as bulletin board system (BBS), public service network, and toll free services, this will be a better choice. Due to the time consuming dialing procedure (16-60 Sec.), the efficiency is lower than that of leased lines. It is even worse when line or destination is busy. Furthermore, the communication path is different at each dial, so the line quality is not ensured. Besides, it doesn't guarantee good security.

To make this modem operate in 2w leased line, 4w leased line, or dial line, you need to do some settings with the Lne Type Selection under LINE SETUP menu.
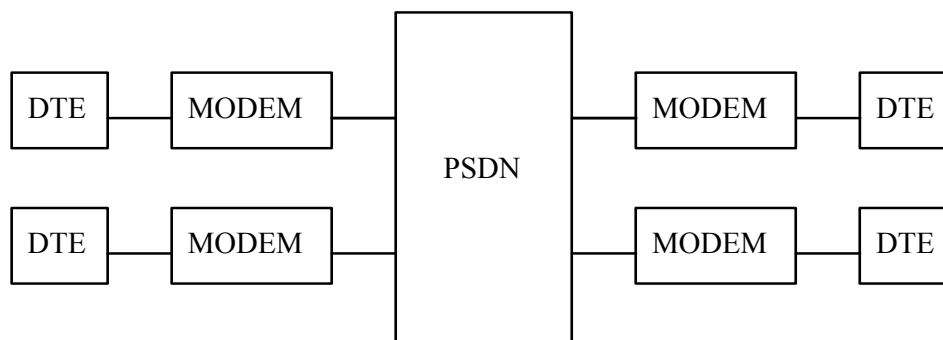
FIG 4-2: Dial Line

4.3 2W/4W Leased Line

We had talked modem operate in the previous section. There are two-wire leased lined and four-wire leased line.

2W leased line achieves full duplex with only a pair of lines. There comes up the problem of interference. In V.21, V.22, V.22bis operating modes, the T-288C used the frequency split method. Whereas, in V.32/V32bis/V.34 mode, it must provides "echo cancellation", because originate and answer modems occupy the same frequency band.

4W leased line offers two independently unilateral transmission channel, therefore, it can achieve full duplex communication with less interference.

Obviously, the line quality of 4W leased line is better than that of 2W leased line. However, the TAINET Network Series Modem does an excellent job with both 2W and 4W leased lines and even dial line.

```
┌─────┐   ┌─────────┐           ┌─────────┐   ┌─────┐
│ DTE │───│  MODEM  │──  ~  ──  │  MODEM  │───│ DTE │
└─────┘   └─────────┘           └─────────┘   └─────┘
```

2W Leased Line

```
          ┌─────────┐    ~      ┌─────────┐
┌─────┐   │  MODEM  │───────────│  MODEM  │   ┌─────┐
│ DTE │───│         │    ~      │         │───│ DTE │
└─────┘   └─────────┘───────────└─────────┘   └─────┘
```
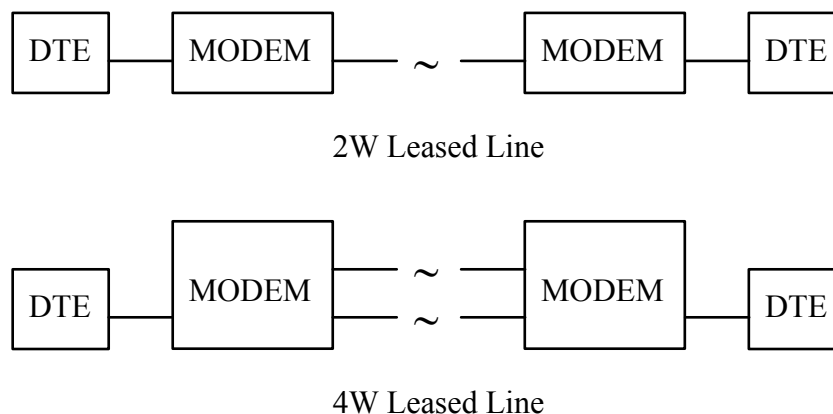
4W Leased Line

FIG. 4-3: 2W/4W leased line.

4.4 Answer Mode VS. Originate Mode

While using the dial line, there must be a modem initiating the call, once the exchanger recognizes the number, it connects the circuit to the answering modem with ring signals. Answering modem can pick up the call manually or automatically. Afterward, it issues the answer tone to connect with the originate modem. Usually, we call the modem which dials the call as originate mode and the other one as answer mode. According to the role of the connection the training sequence and working frequency band of either modem is different from each other even operating with leased line.

With 2/4-wire full-duplex operation such as V.21, V.22,V.22bis, V.23,V.32, V.32bis, V.34, Bell 103, and Bell 212A, there should be an originate mode and an answer mode. However, with other 4-wire full-duplex operations such as V.26, V.27bis, V.29 and V.33 the designation of originate and answer ends is not necessary.

You may find the information of originate/answer settings in the "ORG/ANS MODE" column of "CONFIG MODEM" MENU. Note that the modem will automatically determine either mode whenever you use the "AT" commands, front panel dialing, or auto answering.

4.5 Synchronous VS. Asynchronous

The data formats of both connecting modems must be exactly the same in order to exchange data with each other.

There are synchronous and asynchronous data formats. The common personal computers and terminals are asynchronous. Whereas, the host computers and their terminals are often synchronous.

For most multiplexes, the connecting modems should be synchronous. However, the user should know the type of the data terminal equipment (DTE) to get proper operation.

Except V.21, V.23, and Bell 103 which only can operate in asynchronous mode, other protocols can run in either mode.

About the settings of this issue, you may find it at "Data Format" column of "CONFIG DTE" menu. Note that if the asynchronous mode is selected, you need to set " Data Bits ", " DTE Speed", "Parity" and "Stop Bit" as well. On the other hand, if you operate the modem with "AT" command, it will automatically determine these parameters.

4.6 Error Correction And Data Compression

The TAINET Network Series Modem supports "Error Correction "and "Data Compression" while operating in asynchronous mode. In addition to 100% error free, it also provides two to four times data compression rate to increase throughput.

MNP class 4 provides error corrections. MNP class 5 provides data compression for up to two times. On the other hand, V.42 and V.42bis are the recommendations from CCITT V.42 to provide error correction and V.42bis provides data compression for up to four times.

Due to the improved throughput, the T-288C provides DTE speed up to 76800 bps for between data terminal and modem.

During connecting, the modem automatically recognizes the protocol being used by the remote modem and set the priority order as V.42bis$\rightarrow$V.42$\rightarrow$MNP-5 $\rightarrow$MNP-4$\rightarrow$ NORMAL.

Under these error correction and data compression operations, there should be some kinds of flow control between modem and data terminal equipment (DTE) to avoid data loss. The hardware solution to the modem is by controlling RTS and CTS signals. The software solution is by utilizing X-on and X-off codes.

To find the setting information dealing with error correction and data compression, you may look up the "PROTOCOL" menu. In addition, "CONFIG DTE" menu gives you the guide to flow control setting.

4.7 Configuration Profile Set-Up

The TAINET Network Series Modem have various operating modes. To save your energy, it provides 10 sets of factory default settings as well as 10 sets of user setup profile which store data even the power is off. Users may choose the most similar factory default setting; make some modifications with front panel or by AT commands from terminal then save the modified setting to a user profile. From then on, once the modem is turned on, it will use this user profile as default.

Below is the profile setting procedure.

(1) With the main menu (MENU), press " ENTER " key to get " menu SELECT " screen.

(2) Press "←" to move to " PROFILE " column, then press "ENTER" to enter "PROFILE" menu.

(3) Press "←" to move to "LOAD" column, then press "ENTER" key to enter "SELECT SCREEN" selection.

(4) Use the "←" and "→" keys to move the desired file; then press "ENTER" key to finish setting. Now you should find a "Has Been Done" message on the screen.

4.7.1 T-288C Factory Profile Default Setting

Profile #	#0	#1	#2	#3	#4	#5	#6	#7	#8	#9
SETTING ITEM	ASY-DL-AT-NONE	ASY-DL-AT-AUTO	SYN-DL-V25-NONE	ASY-2L-ANS-V34	ASY-2L-ORG-V34	SYN-2L-ANS-V34	SYN-2L-ORG-V34	SYN-4L-ANS-V34	SYN-4L-ORG-V34	SYN-4L-V33/V29
DATA FORMAT	Async	Async	SYNC	Async	Async	SYNC	SYNC	SYNC	SYNC	SYNC
COMMAND	AT	AT	V25bis	DUMB	DUMB	DUMB	DUMB	DUMB	DUMB	DUMB
LINE Type	DIAL	DIAL	DIAL	2WL.L	2WL.L	2WL.L	2WL.L	4WL.L	4WL.L	4WL.L
RING Times	2	2	2	2	2	2	2	2	2	2
MODEM SPD.	Adapt	Adapt	Adapt	V.34 288	V.34 288	V.34 288	V.34 288	V.34 288	V.34 288	V.33 144T
ORG/ANS	ANS	ANS	ANS	ANS	ORG	ANS	ORG	ANS	ORG	ANS
L.L TXL	-10dBm	-10dBm	-10dBm	-10dBm	-10dBm	-10dBm	-10dBm	-8 dBm	-8 dBm	-4 dBm
Dy Range	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	+3.-26
DCD off time	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	5 sec
Auto Retrain	On	On	On	On	On	On	On	On	On	On
DTE Speed	9600	9600	9600	9600	9600	9600	9600	9600	9600	9600
PROTOCOL	Direct	V42bis	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
FLOW CTRL.	XonXoff	RTSCTS	Off	Off	Off	Off	Off	Off	Off	Off
RTS CTRL.	ON	ON	Normal	ON	ON	Normal	Normal	Normal	Normal	Normal
DCD CTRL.	ON	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
CTS CTRL.	EIA	CCITT	CCITT	EIA	EIA	EIA	EIA	EIA	EIA	CCITT
DTR OFF	ON	ON	DISCNT	ON	ON	ON	ON	ON	ON	ON
DSR CTRL.	ON	ON	Normal	ON	ON	ON	ON	ON	ON	ON
Disconnect Method	Immed-iate	Immed-iate	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down

4.7.2 ITM-3296bis Factory Profile Default Setting

Profile #	#0	#1	#2	#3	#4	#5	#6	#7	#8	#9
SETTING ITEM	ASY-DL-AT-NONE	ASY-DL-AT-AUTO	SYN-DL-V25-NONE	ASY-2L-ANS-32b	ASY-2L-ORG-32b	SYN-2L-ANS-32b	SYN-2L-ORG-32b	SYN-4L-ANS-32b	SYN-4L-ORG-32b	SYN-4L-V33/V29
DATA FORMAT	Async	Async	SYNC	Async	Async	SYNC	SYNC	SYNC	SYNC	SYNC
COMMAND	AT	AT	V25bis	DUMB	DUMB	DUMB	DUMB	DUMB	DUMB	DUMB
LINE Type	DIAL	DIAL	DIAL	2WL.L	2WL.L	2WL.L	2WL.L	4WL.L	4WL.L	4WL.L
RING Times	2	2	2	2	2	2	2	2	2	2
MODEM SPD.	Adapt	Adapt	Adapt	V.32b 144	V.32b 144	V.32b 144	V.32b 144	V.32b 144	V.32b 144	V.33 144T
ORG/ANS	ANS	ANS	ANS	ANS	ORG	ANS	ORG	ANS	ORG	ANS
L.L TXL	-10dBm	-10dBm	-10dBm	-10dBm	-10dBm	-10dBm	-10dBm	-8 dBm	-8 dBm	-4 dBm
Dy Range	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	-6..-43	+3.-26
DCD off time	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	5 sec
Auto Retrain	On	On	On	On	On	On	On	On	On	On
DTE Speed	9600	9600	9600	9600	9600	9600	9600	9600	9600	9600
PROTOCOL	Direct	V42bis	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
FLOW CTRL.	XonXoff	RTSCTS	Off	Off	Off	Off	Off	Off	Off	Off
RTS CTRL.	ON	ON	Normal	ON	ON	Normal	Normal	Normal	Normal	Normal
DCD CTRL.	ON	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
CTS CTRL.	EIA	CCITT	CCITT	EIA	EIA	EIA	EIA	EIA	EIA	CCITT
DTR OFF	ON	ON	DISCNT	ON	ON	ON	ON	ON	ON	ON
DSR CTRL.	ON	ON	Normal	ON	ON	ON	ON	ON	ON	ON
Disconnect Method	Immed-iate	Immed-iate	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down

4.7.3 T-1496 & T-1496terbo Factory Profile Default Setting

Profile #	#0	#1	#2	#3	#4	#5	#6	#7	#8	#9
SETTING ITEM	ASY-DL-AT-NONE	ASY-DL-AT-AUTO	SYN-DL-V25-NONE	ASY-2L-ANS-32b/32t	ASY-2L-ORG-32b/32t	SYN-2L-ANS-32b/32t	SYN-2L-ORG-32b/32t	SYN-4L-ANS-32b/32t	SYN-4L-ORG-32b/32t	ASYN-2L-ANS-REL
DATA FORMAT	Async	Async	SYNC	Async	Async	SYNC	SYNC	SYNC	SYNC	Async
COMMAND	AT	AT	V25bis	DUMB	DUMB	DUMB	DUMB	DUMB	DUMB	DUMB
LINE Type	DIAL	DIAL	DIAL	2WL.L	2WL.L	2WL.L	2WL.L	4WL.L	4WL.L	2WL.L
RING Times	2	2	2	2	2	2	2	2	2	2
MODEM SPEED	Adapt	Adapt	Adapt	V.32b 144/terbo 192	V.32b 144/terbo 192	V.32b 144/terbo 192	V.32b 144/terbo 192	V.32b 144/terbo 192	V.32b 144/terbo 192	V.32 Adapt
ORG/ANS	ANS	ANS	ANS	ANS	ORG	ANS	ORG	ANS	ORG	ANS
L.L TXL	-10dBm	-10dBm	-10dBm	-10dBm	-10dBm	-10dBm	-10dBm	-4 dBm	-4 dBm	-10 dBm
Dy Range	-4..-43	-4..-43	-4..-43	-4..-43	-4..-43	-4..-43	-4..-43	+4.-33	+4.-33	-4..-43
DCD off time	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec	15 sec
Auto Retrain	On	On	On	On	On	On	On	On	On	On
DTE Speed	9600	9600	9600	9600	9600	9600	9600	9600	9600	19200
PROTOCOL	Direct	V42bis	Direct	Direct	Direct	Direct	Direct	Direct	Direct	MNP5
FLOW CTRL.	XonXoff	RTSCTS	Off	Off	Off	Off	Off	Off	Off	RTSCTS
RTS CTRL.	ON	ON	Normal	ON	ON	Normal	Normal	Normal	Normal	ON
DCD CTRL.	ON	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
CTS CTRL.	EIA	CCITT	CCITT	EIA	EIA	EIA	EIA	EIA	EIA	CCITT
DTR OFF	ON	ON	DISCNT	ON	ON	ON	ON	ON	ON	ON
DSR CTRL.	ON	ON	Normal	ON	ON	ON	ON	ON	ON	ON
Disconnect Method	Immediate	Immediate	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down	Clear Down

4.8 Remote Access

The TAINET Network Series Modem is equipped with remote access functions. You may use it to get the line condition and working status as well as change the operation mode and parameters of the remote site TAINET modem. It offers you the conveniences of installation and maintenance. Note that both modems should be offering by TAINET, furthermore, the "Romote grant" should be set (under "AUXILIARY" MENU). However, these functions are not effective before connection.

If you are using the front panel, press "ENTER" key in the main menu to enter "Remote/Local" selection. Use "←" or "→" keys to select "Romote"; then press "ENTER" key to activate remote functions. About 2 seconds later, the screen shows" Remote ←" and the "L" on the left upper corner of the screen is changed to "R". Now the modem is working in the remote mode. At this moment, what you see on the local modem is exactly the same as that of the remote modem, In other words, there is no difference for you to operate the front panel of the local modem from the remote one except that the keys on the remote modem are disabled.

To return to local operation, what you need to do is to select "Local" at the "Local/Remote" menu then press "ENTER" key. Tainet modems offer another remote access function through secondary channel in V.34 mode. Before using this secondary remote access functio, you should set "Sec. channel" to be ON.

4.9 Multi-standard Handshake

The **T-288C** with ITU-T recommendations V.34, V.32bis, V.32, V.22bis, V.22, V.21, V.8, V.42 and V.42bis operating standard.

The **T-1496terbo** with V32terbo and ITU-T recommendations V.32bis, V.32, V.22bis, V.22, V.21, V.42 and V.42bis operating standards.

The **T-1496** with ITU-T recommendations V.32bis, V.32, V.22bis, V.22, V.21, V.42 and V.42bis operating standards.

The **ITM-3296bis** with ITU-T recommendations V.32bis, V.32, V.22bis, V.22, V.21, V.42 and V.42bis operating standards.

This functions in both calling and answering mode to automatically recognize the remote modem standard and connect to it accordingly.

4.10 Auto Fallback And Fall Forward

When auto fallback & fallforward is enabled in V.34 or V.32bis mode, the modem will automatically initial a V.34 or V.32bis rate renegotiation when the line condition changes, so that the optimum available data rate is always select with minimal interruption to user data.

4.11 Auto Dial Back-Up

When you apply the TAINET Network Series Modem to leased lines, no matter what protocol you are using, in case that the lines don't function well, you may allow modem dial a stored number via a dial line to rebuild the connection. This line is called "back-up line."

While using the back-up line, the modem periodically checks the recovery of leased lines to find the opportunity to go back to leased lines in order to save the charge of dial line.

To use this function, you must set "leased To Dial" and "Dial To Leased" to be "AUTO" under "LINE SETUP" menu; also fill up "Backup Tel#1" and "Backup Tel#2". However, you may set "Tel#2" to be "None" if only one phone number is applicable.

This function may be used in conjunction with "Auto Redial" function. You may find the related materials in the section dealing with "DIAL" menu.

The TAINET Network Series Modem also supports a special function: once the dial lines disconnect and no matter what protocol you are using, it will automatically dial the number again to rebuild the connection.

To use this function, the "Dial To Dial" under "LINE SETUP" menu must be set to be ON. Furthermore, you have to set "Redial Delay" and "Redial Times" under "DIAL" menu as well.

4.12 Auto Call Back Security

Due to the uncertainty and poor security of dial lines, the TAINET Network Series Modem supports an "Auto Call Back Security" function. You may store a phone number in modem. Once the phone line rings, it picks the line up for a moment then drop the line. Consequently it dials the stored number and tries to connect again. This function ensures security.

Before using this function, you need not only to set "Call-Back" under "Auxiliary" menu to ON but also set "Call-Back Time" and "Call Back Tel#" which determine the period of the first time connection and call back telephone number respectively.

4.13 Line Status Monitoring

In order to let users manage transmission conditions, the TAINET Network Series Modem provides a signal quality displayed at right lower corner of the screen. It ranges from 0 to 9. The following shows the relationship between the displayed number and bit error rate (BER).

9	--	$< 10^{-9}$
8	--	$< 10^{-8}$
7	--	$< 10^{-7}$
6	--	$< 10^{-6}$
5	--	$< 10^{-5}$
4	--	$< 10^{-4}$
3	--	$< 10^{-3}$
2	--	$< 10^{-2}$
1	--	$< 10^{-1}$
0	--	NO Connect

Basically, 10^{-5} to 10^{-6} is the basic required bit error rate. If this condition is not achievable; leased line users should report to telephone company, however, it is better for dial line users to try the dial again.

There are some real time line condition information which may help you judge the line quality:

1.	Transmitted signal level	Ex:	Tx level = -10 dBm
2.	Received signal level		Rx level = -25 dBm
3.	Signal to noise ratio		S/N Ratio = 35 dB
4.	Received frequency shift		F-Shift = 0.2 Hz
5.	Far-end frequency shift		F F-Shift = 1.7 Hz
6.	Round trip delay		Delay = 560 ms
7.	Near-end echo level		N Echo = -20 dB
8.	Far-end echo level		F Echo = -40 dB
9.	Terminal mode		DTE = 19200 ASY 10
10.	Retrain count		Retrains = 1

The parameters above can be found in "STATUS" menu. In conjunction with remote access functions, you may further observe remote status.

4.14 B.E.R Test

In addition to the parameters stated in the previous section, the TAINET Network Series Modem also offers bit error rate test without any extra test instruments.

Before using the BER test, you have to build a connection then enter "TEST" menu, set "BER Test" to be ON, select "Error count". Note that if you want to do this test with both modems, you need to do the setting described above with both modems. During test, you may press "→" or "←" key to send some error codes and observe whether the other modem received them or not. The number of error bits for each issue is from 2 to 5. At the beginning of the test, you may press "ENTER" to clear "Error Count." Wait a period, you may get B.E.R by dividing error count by total transmitted bits. There are three different test patterns, say 511, 2047, and ALT (alternate), you may choose from. The selection can be done at "TP Type" under "Test" menu. Note that the settings of both modems should be consistent.

You may execute this test even no one is at the remote site. How to make it? It can be done by utilizing remote digital loopback (RDL) which makes remote modem loopback its received data. To start it, activate "RDL" in "Test" menu, then execute BER test stated above. Beware that error codes generated by local modem will be received by itself. Hence, the error count you get is the sum of that of transmitted and received routes(bilateral).

You may judge whether the modem is good or not by operating local analog loopback then execute BER test. No matter how long you execute this test, the error count should be 0.

4.15 Intelligent Dial And Redial

In order to reduce the tediously repetitive dialing, the TAINET Network Series Modem provides the most convenient intelligent dialing functions. In addition to correctly detect busy tone, dial tone, and ring back tone, it offers 0 to 255 times re-dial with the interval of 0 to 255 minutes. You may fill up to 10 telephone numbers. The modem can automatically dial the next number when a number is not available (busy). If the next one is not available either, it dials the next following one, When it reaches the last one, starting over with the first number. These procedure will repeat until it has tried for the predetermined times.

There are some data terminal equipments such as multiplexes, controllers, and synchronous terminals can't issue "AT" commands to dial. The modem offers you a very convenient way to dial by means of operating front panel. In addition to ten-number file, it provides you a 108/1 auto dial function which dial pre-determined number when you turn the modem on or when DTR is turned on.

The setting of the dialing functions is located in "DIAL" menu. "Edit A Number" lets you edit a phone number. "Redial Delay" determines re-dial interval. "Redial times" sets the times of re-dial. For the intelligent dialing described previously what you have to do is to insert a "@" character in front of the phone number.

4.16 Front Panel Lock and Password

In order to prevent from the operation of unauthorized persons, we offer you this function. After you set "Front Lock" under "PROFILE" menu to be "Lock", even the front panel keys are still effective, all the operations affecting transmission are not allowed. You only may observe the setting and monitor the line conditions.

To release the lock, you need to enter a password. The following is the table of panel keys.

$$
\begin{array}{lll}
\text{"EXIT"} & --- & X \\
\text{"ENTER"} & --- & E \\
\text{"VO/DA"} & --- & V \\
\text{"}\rightarrow\text{"} & --- & R \\
\text{"}\leftarrow\text{"} & --- & L \\
\end{array}
$$

The factory setting is "REEE", and can be modified by users. Before you change the password, you need to enter the old one. So don't forget the password you had entered, otherwise you must use a global password "XVRE" to release it.

4.17 ITU-T V.13 and Pseudo, Simulated Carrier Control

V.13 operation:

The modem normally operates in full duplex. However, some applications may requires control of a remote DCD signal by a local RTS signal. V.13 operation allows local RTS control of remote DCD signal without on-off carrier switching in half duplex operation. The related setting is located in DCD control under "CONFIG DTE" menu.

Pseudo carrier operation:

The modem will switch DCD off after 24 bits of continous mark (binary 1) are received. The first space (binary 0) turns DCD on again. Pseudo carrier operation applicable to half duplex network just like V.13 operation. the related setting is located in DCD control under "CONFIG DTE" menu.

4.18 G3 FAX Send / Receive

The TAINET Network Series Modem offers G3 fax Send and Receive function and EIA-TIA Class 1 commands.

Fax Class 1 Command Sets

Command	Summary
	Capabilities Identification And Control
+FCLASS?	Service Class Indication
+FCLASS=?	Service Class Capabilities
+FCLASS=	Service Class Selection
	Service Class 1 Action Commands
D	Originate a call
A	Answer a call
+FTS=n	Stop transmission and pause, (10 ms intervals, n=0-255)
+FRS=n	Wait for silence, (10 ms intervals n=0-255)
+FTM=<MOD>	Transmit data with <MOD> carrier
+FRM=<MOD>	Receive data with <MOD> carrier
+FTH=<MOD>	Transmit HDLC data with <MOD> carrier
+FRH=<MOD>	Receive HDLC data with <MOD> carrier

The MOD parameter may take on the following values:

Value	Modulation	& Speed
3	V.21 ch.2	300
24	V.27 ter	2400
48	V.27 ter	4800
72	V.29	7200
96	V.29	9600

4.19 Symbol Rate Selection

In V.34 mode the symbol rate to be used is automatically selected during the handshake, based on the results of the line probing procedure. User control of the symbol rate is achieved setting V34 Baud Rate selection under AUXILIARY menu.

For perfermance and coding reasons, there are some restrictions on the combinations of symbol rates and data allowed. The following are disable:

Symbol Rate	Bit Rates Not Allowed
2400 baud	33600, 31200, 28800, 26400, 24000 bps
2743 baud	33600, 31200, 28800, 2400 bps
3000 baud	33600, 31200, 2400 bps
3200 baud	33600, 2400 bps
3429 baud	2400 bps

CONTENT

CHAPTER 5   INSTRUCTION SETS

5.1 AT Command Set

Table 5-1: AT Command Set

Cmd	Function Description
A	enter answer mode
A/	repeat previous command
P	originate mode for pulse dialing
T	originate mode for tone dialing
D	originate mode for dialing
DSn	dial stored phone number n = 0-9
En	command echo 0:no 1:yes
Hn	0:on hook 1:off hook
In	display 0:product code 1:checksum 2:verify value
Ln	speaker volume 0,1:low 2:medium 3:high
Mn	speaker control 0:always off 1:on until DCD is detected 3:off during dialing,on until DCD is detected
Nn	DCE speed follow 0:DTE speed 1:by link
On	0:return to data mode 1:return to data mode and initiate retrain
Qn	send result code 0:yes 1:no
Sn?	read s-register n=s-reggster number
Sn=x	modify s-register n value to x
Vn	result code 0:short form (digits)1:long form (words)
Wn	long form result code 0:standard 1:extend1 2:extend2

Table 5-1: AT Command Set (cont.)

Cmd	Function Description
Xn	X0:return 0-4 result codes;no dial,busy tone detect X1:return 0-5,10-39 result codes;no dial,busy tone detect X2:return 0-6,10-39 result codes;no busy tone detect X3:return 0-5,7,10-39 result codes;no dial tone detect X4:return all(0-39) result codes;dial,busy tone detect
Yn	long space disconnect 0:no 1:yes
Zn	reset modem & recalls user profile n , n=0-9
&Cn	DCD control 0:forced on 1:normal 2:V.13 HDX 3:pseudo HDX
&Dn	DTR control 0:forced on 1:DTR off enter command mode 2:DTR off disconnect 3:DTR off reset modem
&Fn	recall factory default profile n, n=0-9
&Gn	guard tone control 0:disabled 1:550Hz 2:1800Hz
&Ln	line type control 0:dial line 1:2w L-L 2:4w L-L
&Mn	direct mode data format 0:Async 1:Sync
&Qn	async/sync mode 0:async 1:async command/sync data 2:sync mode,DTR on auto dial 3:sync mode,manual dial
&Rn	RTS control 0:normal 1:forced on
&Sn	DSR control 0:forced on 1:on in data mode
&Tn	0:end test 1:local analog loopback test (LAL) 2:reserved 3:local digital loopback test (DL) 4:remote digital loopback grant on 5:remote digital loopback grant off 6:remote digital loopback test (RDL) 7:remote digital loopback pattern test (RDL+TP) 8:local analog loopback pattern test (AL+TP) 9:reserved 10:test pattern generator & detector (TP)
&Vn	display user profile n, n=0-9
&Wn	write active configuation to User Profile n, n=0-9

Table 5-1: AT Command Set (cont.)

Cmd	Function Description
&Xn	transmit clock source 0:interal 1:exteral 2:loopback
&Yn	recall user profile n 0n power up , n=0-9
&Zn=x	store phone number x to memory location n, n=0-9
\An	MNP max block size 0:64 1:128 2:192 3:256 bytes
\Bn	disconnect send break Sequence 0:no 1:yes
\Gn	DCE-DCE flow control 0:disable 1:enable
\Hn	ENQ/ACK 0:none 1:to host 2:to peripheral
\Jn	speed conversion 0:On 1:Off
\Kn	break option 0:expedited destructive 1:expedited nondestructive 2:queued
\Nn	data transfer mode 0:direct 1:normal 2:auto-reliable 3:reliable
\Qn	flow control 0:none 1:XON/XOFF 2:RTS/CTS 3:CTS
\R	remote access command
\Xn	Xon/Xoff pass through 0: Off 1: On
%An	async tolerance 0:-2.5% ... 1% 1:-2.5% ... 2.3%
%Cn	data compression 0:off 1:on
%Dn	DTR control 0:normal (108/2) 1:DTR on auto dial/answer (108/1)
%En	auto retrain 0:off 1:on

Table 5-1: AT Command Set (cont.)

Cmd	Function Description
%Gn	modulation mode: 0 ADAPTIVE 14 V29_9600 28 V34_28800 1 V21_0..300 15 V32_4800 29 Reserved 2 B103_0..300 16 V32b_7200T 30 Reserved 3 V22_1200 17 V32_9600 31 V34_4800 4 B212_1200 18 V32_9600T 32 V34_7200 5 V22b_2400 19 V32b_12000T 33 V34_9600 6 V23_600 20 V32b_14400T 34 V34_14400 7 V23_1200 21 V33_4800 35 V34_16800 8 V26_1200 22 V33_7200T 36 V34_21600 9 V26_2400 23 V33_9600T 37 V34_26400 10 V27b_2400 24 V33_12000T 38 V34_12000 11 V27b_4800 25 V33_14400T 39 V34_32000 12 V29_4800 26 V34_19200 40 V34_2400 13 V29_7200 27 V34_24000 41 V34_31200 42 V34_33600
%Ln	transmit output level for leased line,(n=0..-31) dBm
%Mn	multi-standard mode 0:V.32bis Annex 1:V.100
%Sn	status display: 0:all 1:SNR 2:RXL 3:frequency shift 4:far-end echo 5:near-end echo 6:far echo freq shift 7:delay 8:DTE speed 9:DCE speed 10:TXL 11:DTR 12:DSR 13:RTS 14:CTS 15:DCD
%Tn	test pattern (TP) selection 0:ALT 1:511 2:2047
%Un	auto DTE speed detect (auto baud mode) 0:off 1: on

5.2 Dial Modifiers

Table 5-2 Dial Modifiers

CODE	Function Description
, <	pause for 2 seconds
W :	wait for dial tone before dialing
! &	flash hook switch for 0.5 seconds
R	reverse to answer mode after dialing
p	pulse dialing
T	tone (DTMF) dialing
%	send calling tone for dialing
=	dialing or other action after off-hook

5.3 Result Codes

Table 5-3 Result Codes

Short	Long form	Extended 1	Extended 2
0	OK		
1	CONNECT		
2	RING		
3	NO CARRIER		
4	ERROR		
5	CONNECT 1200	1200/MOD/EC	DCE/ARQ/MOD/EC
6	NO DIAL TONE		
7	BUSY		
8	NO ANSWER TONE		
9	CONNECT 600		
10	CONNECT 2400	2400/MOD/EC	DCE/ARQ/MOD/EC
11	RINGBACK TIMEOUT		
12	RDL GRANTED		
13	RDL DENIED		
14	TRYING TO CONNECT		
15	FAX		
16	INACTIVITY TIMEOUT		
17	NUMBER NOT STORED		
18	CIRCUIT BUSY		
19	CONNECT 75TX/600RX		
20	MNP4		
21	CONNECT 600TX/75RX		
22	CONNECT 57600	57600/MOD/EC	DCE/ARQ/MOD/EC
23	V42		

Table 5-3 Result Codes (cont.)

Short	Long form	Extended 1	Extended 2
24	REDIALING		
25	CONNECT 75TX/1200RX		
26	CONNECT 1200TX/75RX		
27	CONNECT 75		
28	CONNECT 110		
29	CONNECT 150		
30	CONNECT 4800	4800/MOD/EC	DCE/ARQ/MOD/EC
31	CONNECT 9600	9600/MOD/EC	DCE/ARQ/MOD/EC
32	BLACKLISTED		
33	MNP5		
34	V42BIS		
35	CONNECT 19200	19200/MOD/EC	DCE/ARQ/MOD/EC
36	CONNECT 38400	38400/MOD/EC	DCE/ARQ/MOD/EC
37	CONNECT 7200	7200/MOD/EC	DCE/ARQ/MOD/EC
38	CONNECT 14400	14400/MOD/EC	DCE/ARQ/MOD/EC
39	REMOTE OPERATING		
40	CONNECT 12000	12000/MOD/EC	DCE/ARQ/MOD/EC
41	CONNECT 76800	76800/MOD/EC	DCE/ARQ/MOD/EC
42	CONNECT 24000	24000/MOD/EC	DCE/ARQ/MOD/EC
43	CONNECT 28800	28800/MOD/EC	DCE/ARQ/MOD/EC
44	CONNECT 16800	16800/MOD/EC	DCE/ARQ/MOD/EC
45	CONNECT 21600	21600/MOD/EC	DCE/ARQ/MOD/EC
46	CONNECT 26400	26400/MOD/EC	DCE/ARQ/MOD/EC
47	Reserved		
48	CONNECT 115200	115200/MOD/EC	DCE/ARQ/MOD/EC
49	CONNECT 31200	31200/MOD/EC	DCE/ARQ/MOD/EC
50	CONNECT 33600	33600/MOD/EC	DCE/ARQ/MOD/EC

5.4 V.25bis Auto call Unit

V.25bis auto call unit is used for auto calling in asynchronous and synchronous data formats.

1. V.25bis Commands

    A CRNx   - Call request - dial a phone number (x) entered on DTE keyboard.

    B CRSy   - Call request - dial a phone number stored in specified memory address (y). y=0-9.

    C PRNy;x   - Program number - store a phone number (x) in specified memory address (y). y=0-9

    D RLN   - Request list of all stored numbers.

    E CIC   - Connect incoming call. Auto answer enable.

    F DIC   - Disregard incoming call. Auto answer disable.

2. V.25bis Responses

    A INC   - Modem detects an incoming call.

    B INV   - Modem received invalid command entry.

    C VAL   - Modem received valid command entry.

    D LSN   - Modem responses LSN when received RLN command.

    E CNX   - Connection.

3. V.25bis Call Failure Responses

    A CFIET   - Busy tone had been detected

    B CFIAB   - Modem aborted a call.

    C CFIRT   - Ringback timeout.

    D CFICB   - Modem busy.

    E CFINS   - No phone number is stored.

    F CFIND   - No dial tone is detected.

CONTENT

CHAPTER 6   MAINTENANCE

6.1 Description

This chapter gives you the information of maintenance and the required instruments in order to let you recover the troubles quickly.

6.2 Instruments

The only instrument you need is a mult-meter, due to the embedded digital and analog test abilities.

6.3 Self test

Self test will execute whenever the modem is turned on. If some faults detected, the TAINET Network Series Modem will show an error message on LCD screen.

Some error messages are shown as follows:

> PLU ROM FAULT
> PLU RAM FAULT
> LCD INTERFACE FAULT
> KEYBOARD FAULT
> DATA PUMP FAULT
> PIO FAULT
> SIO FAULT
> CTS FAULT
> LLU ROM FAULT
> LLU RAM FAULT
> PLU RESPONSE FAULT
> MNP MODULE FAULT
> LLU EEPROM FAULT

6.4 Periodic Maintenance

For every three months, you should do the following jobs.

(A) Turn the power off, open top cap, clean the modem, check the plugs, make sure all the connectors are connected firmly.

(B) Be sure that the indicators function well.

6.5 Troubleshooting

Once the TAINET Network Series Modem malfunctions, please check and record the indicators at the moment then turn the power off. Consequently, make sure the IC's on printed circuit board are firmly sited. Try to turn the power on again, if the trouble still exists, please follow the procedures below.

1) Power Unit

   • Make sure you get a proper power source. If no indicator is lighted, probably the problem is the power unit.
   • Check the power fuse; if it is broken, replace it.

2) RS-232 Interface

   • Do the AL (local analog loopback) test, feed some data into the modem and check if they were returned.
   • Please make sure the interface is connected firmly; also check if the cable is in good condition.

6.6 Return Procedures

We suggest the individuals who hold a malfunctioned the TAINET Network Series Modem would contact with your local representative or distributor of Tainet, or just directly access our customer service department as soon as possible in order not to cause catastrophe. You may find the contact address and phone number in the cover sheet of this manual.

APPENDIX 1: S-register Table for T-288C and ITM-3296bis

NO.	DEFAULT	UNIT	FUNCTION		
0	2	Times	Rings before Auto Answer		
1	0	Times	Ring count		
2	43	Decimal	Escape code		
3	13	Decimal	End-Of-Line character		
4	10	Decimal	Line-Feed character		
5	8	Decimal	Backspace character		
6	2	Second	Dial tone detect time		
7	45	Second	Time wait for carrier		
8	2	Second	Pause time for ","		
9	6	100 ms	Carrier detect time		
10	15	1/0.1S	Lost carrier detect time *1 sec unit for V.34/V.32bis/V.32/V.33/V.29 0.1 sec unit for V.22bis/V.22		
11	72	ms	DTMF Tone Duration		
12	14	100 ms	Escape sequence pause		
13	3	bit 4..0	DTE speed	bit 4...0	DTE speed
		0	38400 bps	15	24000 bps
		1	19200 bps	16	28800 bps
		2	14400 bps	17	16800 bps
		*3	9600 bps	18	21600 bps
		4	7200 bps	19	26400 bps
		5	4800 bps	20	32000 bps
		6	3600 bps	21	115200 bps
		7	2400 bps	22	31200 bps
		8	1800 bps	23	33600 bps
		9	1200 bps		
		10	600 bps		
		11	300 bps		
		12	12000 bps		
		13	57600 bps		
		14	76800 bps		

14	00001010	binary				
	(10)	bit 0	*	0	CAL0	Calling tone Off
				1	CAL1	Calling tone On
		bit 1		0	E0	Command echo disable
			*	1	E1	Command echo enable
		bit 2	*	0	Q0	Status On
				1	Q1	Status Off
		bit 3		0	V0	Result code short form
			*	1	V1	Result code long form
		bit 4				Reserved
		bit 6,5	*	00	&G0	No guard tone
				01	&G1	550Hz guard tone
				10	&G2	1800Hz guard tone
		bit 7	*	0	ORG0	Answer mode
				1	ORG1	Originate mode

15	00001100	Binary			
	(12)	bit 1,0	*	00	stop bits 1
				01	stop bits 1.5
				10	stop bits 2
		bit 3,2		00	data bits 5
	(Async protocol)			01	data bits 6
				10	data bits 7
			*	11	data bits 8
		bit 5,4	*	00	Parity None
				01	Parity Even
				10	Parity Odd
		bit 6	*	0	ASCII
				1	EBCDIC
		bit 7	*	0	%A0 Basic ASI -2.5% .. +1 %
				1	%A1 Extened ASI -2.5% .. +2.3%

16	00000000	Binary				
	(0)	bit 0	*	0	&T0	TP Off
				1	&T10, &T7	TP On
		bit 1	*	0		RDL Off
				1		RDL On
		bit 2	*	0	&T0	LAL Off
				1	&T1,T8	LAL On
		bit 3	*	0	&T0	LDL Off
				1	&T3	LDL On
		bit 4	*	0	&T0	RDL Off
				1	&T6,T7	RDL On
		bit 5	*	0	Reserved	
		bit 7,6	*	00	%T0	Test pattern ALT
				01	%T1	Test pattern 511
				10	%T2	Test pattern 2047
				11	Reserved	

17	10000000	Binary				
	(128)	bit 1,0	*	00		DTE protocol Async
				01		DTE protocol HDLC/SDLC
				10		DTE protocol BI-SYNC
				11		DTE protocol MONO-SYNC
		bit 3,2	*	00		Block check None
				01		Block check CRC-CCITT
(Sync protocol)				10		Block check CRC-16
		bit 4	*	0	Y0	Long space disc. Off
				1	Y1	Long space disc. On
		bit 5	*	0		Sync character: Default
				1		Sync character: User Define
		bit 6	*	0		DTE address: Global
				1		DTE address: User Define
		bit 7		0	%U0	Auto Baud rate Off
			*	1	%U1	Auto Baud rate on

18	0	Minute				Test timeout limit
19	0	Second				Test timer LSB
20	0	Minute				Test timer MSB

21	01000010	Binary				
	(66)	bit 0	*	0	&S0	DSR Forced On
				1	&S1	DSR Normal
		bit 2,1		00	&C0	DCD Forced On
			*	01	&C1	DCD Normal
				10	&C2	V.13 HDX
				11	&C3	Psuedo HDX

		bit 4,3	* 00	&D0	DTR Forced On
			01	&D1	DTR Off to command mode
			10	&D2	DTR Off Cause disconnect
			11	&D3	DTR Off Cause modem reset
		bit 5	* 0	%D0	DTR Normal (&Q3)
			1	%D1	DTR rising auto Dial/Answer (&Q2)
		bit 6	0	&R0	RTS Normal
			* 1	&R1	RTS Forced On
		bit 7	* 0		Constant Carrier
			1		Control Carrier
22	11000100	Binary			
	(196)	bit 1,0	* 00	L0	Speaker volumn low
			01	L1	Speaker volumn low
			10	L2	Speaker volumn midium
			11	L3	Speaker volumn high
		bit 3,2	00	M0	Speaker Off
			* 01	M1	Speaker Off until DCD on
			10	M2	Speaker Off always on
			11	M3	Off when dialing
		bit 6,5,4	000	X0	Blind dial, basic
			001	X1	Blind dial
			010	X2	Dial tone detection
			011	X3	Busy tone detection
			*100	X4	Dial+busy detection
		bit 7	0	&P0	US M/B (39/61)
			* 1	&P1	UK M/B (33/67)
23	10001010	Binary			
	(138)	bit 1,0	* 00	\N0	Direct mode
			01	\N1	Normal mode
			10	\N2	Auto Reliable V42/MNP
			11	\N3	Reliable V42/MNP
		bit 3,2	00		8 bit length on direct mode
			01		9 bit length on direct mode
			* 10		10 bit length on direct mode
			11		11 bit length on direct mode
		bit6,5,4	* 0		V34 baud rate 3429 only
			1		V34 baud rate 3200 only
			2		V34 baud rate 3000 only
			3		V34 baud rate 2743 only
			4		V34 baud rate 2400 only
			5		Reserved
			6		Reserved
			7		Reserved
		bit 7	0	%E0	Auto retrain Off
			* 1	%E1	Auto retrain On

24	01000000	Binary				
	(68)	bit 1,0	* 00	W0	Standard Result code	
			01	W1	Extended Result code 1	
			10	W2	Extended Result code 2	
		bit 3,2	00	CEQ0	Compromise EQ None	
			* 01	CEQ1	Compromise EQ M1040	
			10	CEQ2	Compromise EQ Cable	
		bit 5,4	* 00	SM0	Reserved	
			01	SM1	Auto FB/FF enable	
			10	SM2	Reserved	
			11	SM3	Reserved	
		bit 6	0		Remote Acess off	
			* 1		Remote Acess ON	
		bit 7	* 0		V.32 Annex	
			1		V100	

25	0000(0)	bit 3..0			DTR drop detection time
	1111(15)	bit 7..4			DTR Rise detection time

26	0	10ms			RTS/CTS delay time

27	00000000	Binary				
	(0)	bit 0	* 0	&Q0,&M0	Async data mode	
			1	&Q1,2,3	Sync data mode	
				&M1,2,3		
		bit 1	* 0	Reserved		
		bit 3,2	* 00	&L0	Dial up line	
			01	&L1	2W leased line	
			10	&L2	4W leased line	
		bit 5,4	* 00	&X0	Internal clock	
			01	&X1	External clock	
			10	&X2	Loopback clock	
		bit 6	* 0	LTD0	Menu L->D	
			1	LTD1	Auto L->D	
		bit 7	* 0	DTL0	Menu D->L	
			1	DTL1	Auto D->L	

28	60	Minute	Restore timing from Dial Line to Leased Line

29	00000010	Binary			
	(2)	bit 0	* 0		Phase jitter filter disable
			1		Phase jitter filter enable
		bit 1	0	&T5	RDL grant Off
			* 1	&T4	RDL grant On
		bit 2	* 0	DRL0	DTE RDL disable
			1	DRL1	DTE RDL enable
		bit 3	* 0	DAL0	DTE AL disable
			1	DAL1	DTE AL enable

		bit 4	*	0	DFB0	Secondary Channel Off
				1	DFB1	Secondary Channel On
		bit 5	*	0	DT	Tone Dial
				1	DP	Pulse Dial
		bit 6	*	0		Echo protect tone Off
				1		Echo protect tone On
		bit 7				Reserved

30	01101010	-dBm		
	(106)	bit 4,3,2,1,0		Leased line TX level (from 0..-31dBm)
		bit 7,6,5,0		Dial line TX level (from 0..-15dBm)

31	00010000	Binary				
	(50)	bit 1,0		00	\Q0	Flow control none
				01	\Q1	Flow control Xon/Xoff
			*	10	\Q2	Flow control RTS/CTS
				11	\Q3	Flow control CTS only
		bit 2	*	0	\G0	DCE-DCE Flow control off
				1	\G1	CE-DCE Flow control control on
		bit 4,3		00	\K0	Break option 0
				01	\K1	Break option 1
			*	10	\K2	Break option 2
				11	\K3	Break option 3
		bit 5	*	0	N0	DCE protocol by DTE speed
				1	N1	BY MODEM negotiation
		bit 6	*	0	\B0	Not send break sequence
				1	\B1	Send break sequence
		bit 7	*	0	\X0	not pass through
					\X1	Xon/Xoff pass through

32	0	Binary		
		bit 7...4		Reserved
		bit 3	*0	DTR on dial/andwer accoring to org/ans steup
			1	DTR on dial/answer according to ring-incoming
		bit 2	*0	nothing
			1	Busy out cause by DTR off
		bit 1	*0	standard AT&F operation
			1	fast AT&F
		bit 0	*0	standard ATZoperation off
			1	fast ATZ operation off

33	00010110		Sync character 1
	(22)		

34	00010110		Sync character 2
	(22)		

35	255	Decimal	DTE address
36	5	Minute	Time from leased to backup
37	10	Times	Retrain Times dial backup
38	0	Times	Redial Times

39	00100101 (37)	Binary bit 7,6 bit 5,4 bit 3,2,1,0	Reserved 00 ECU0 disable 01 ECU1 V42 * 10 ECU2 V42bis 0 MNP0 disable 1.. 5 MNPn MNP level n (4/5)

40	00001111 (15)	Binary bit 1,0			
			00	\A0	MNP block size 64
			01	\A1	MNP block size 128
			10	\A2	MNP block size 192
			* 11	\A3	MNP block size 256
		bit 2	0		Disc. with clear down
			* 1		Immediate Disconnect
		bit 3	0	ADP0	Not send
			* 1	ADP1	Send ADP/ODP in V42
		bit 5,4	* 00	\H0	None of ENQ/ACK
			01	\H1	To Host(Simulate Periphral)
			10	\H2	To Peripheral(Simulate Host)
		bit 7,6	* 00	THR0	DCD -6..-43 dBm
			01	THR1	DCD -6..-33 dBm
			10	THR2	DCD +3..-26 dBm
			11	THR3	DCD +3..-33 dBm

41	00001000 (8)	binary bit 7			
			* 0		Bad S/N redial Off
			1		Bad S/N redial On
		bit 6	* 0		Modem operation
			1		DCT operation
		bit 5	0		Speaker monitor Rx
			1		Speaker monitor Tx + Rx
		bit 4	* 0	\J0	Speed conversion On
			1	\J1	Speed conversion Off
		bit 3	0		CTS off in retraining (CCITT)
			* 1		CTS always follow RTS in data mode (EIA)

			bit 2	*	0	+FAA0 data auto answer mode
					1	+FAA1 data/fax auto answer mode
			bit 1,0	*	00	+FCLASS=0 fax ability disable
					01	+FCLASS=1 fax class 1
42	8	100ms bits 7,6,5,4				V42 detection period
	0	12 times bits 3,2,1,0				Maximum resend Times
43	0	bit 7		*0		V.32bis fast train disable
				1		V.32bis fast train enable
		bit 6		0		V.32bis round-trip handshake disable
				*1		V.32bis round-trip handshake enable
		bit 5		*0		4w echo canceller disable
				1		4w echo canceller enable
		bit 4		*0		Line broken disconnect disable
				1		Line broken disconnect enable
		bit 3		*0		Power backoff disable
				1		Power backoff enable
		bit 2,1,0				DCE inactive time
44	1	Minute				Pause time before redial
45	00001001 (8)	Binary bit 7	*	0		LOCK0 Front panel lock disable
				1		LOCK1 .... enable
		bit 6	*	0		CBK0 call-back off
				1		CBK1 .... on
		bit 5	*	0		no ATT on RX
				1		10 dB ATT on RX
		bit 4,3		00		Dumb mode
			*	01		Hayes AT command
				10		V.25bis command
				11		Reserved
		bit 2,1	*	00		LCD backlight auto off
				01		LCD backlight always on
				10		LCD backlight always off
				11		Reserved
		bit 0		0		Precoding disable.
			*	1		Precoding enable.
46	16	dB				V33/V32 9600 TCM SNR threshold
47	18	dB				V32b/V33 12000 TCM /V32 9600 QAM SNR threshold
48	13	dB				V32/V33 4800 QAM SNR threshold

| 49 | 16 | dB | V22bis 2400 QAM SNR threshold |
| | | | V29   9600 QAM SNR threshold |

| 50 | 0 | HEX 7..4 | * | 0 | Dial-back tel# 2 |
| | | 3..0 | * | 0 | Dial-back tel# 1 |

| 51 | 0 | HEX 7..4 | * | 0 | Call-back tel # |
| | | 3..0 | * | 0 | Auto-dial tel # |

52	0	Decimal			Modem Link Speed
		bit 7..0	*	0	adaptive baud rate
				1	V21_300
				2	B103_300
				3	V22_1200
				4	B212_1200
				5	V22_2400
				6	V23_600
				7	V23_1200
				8	V26_1200
				9	V26_2400
				12	V29_4800
				15	V32_4800
				16	V32b_7200T
				17	V32_9600
				18	V32_9600T
				19	V32b_12000T
				20	V32b_14400T
				21	V33_4800
				22	V33_7200T
				23	V33_9600T
				26	V34_19200
				27	V34_24000
				28	V34_28800
				29	V32terbo_16800T
				30	V32terbo_19200T
				31	V34_4800
				32	V34_7200
				33	V34_9600
				34	V34_14400
				35	V34_16800
				36	V34_21600
				37	V34_26400
				38	V34_12000
				39	V34_32000
				40	V34_2400
				41	V34_31200
				42	V34_33600

53	15	Second	Hold time before call-back
54	2	Second	Ring off time
55	18	bit 7..0	Dial Back-up Speed

0	Adaptive baud rate
1	V21_300
2	B103_300
3	V22_1200
4	B212_1200
5	V22_2400
6	V23_600
7	V23_1200
8	V26_1200
9	V26_2400
10	V27_2400
11	V27_4800
12	V29_4800
13	V29_7200
14	V29_9600
15	V32_4800
16	V32b_7200T
17	V32_9600
18	V32_9600T
19	V32b_12000T
20	V32b_14400T
21	V33_4800
22	V33_7200T
23	V33_9600T
26	V34_19200
27	V34_24000
* 28	V34_28800
29	V32terbo_16800T
30	V32terbo_19200T
31	V34_4800
32	V34_7200
33	V34_9600
34	V34_14400
35	V34_16800
36	V34_21600
37	V34_26400
38	V34_12000
40	V34_2400
41	V34_31200
42	V34_33600

56	21	dB	V32b/V33 14400 TCM SNR threshold V34 SNR threshold

57	15	dB	V29 7200 QAM SNR threshold

58	11000000	Binary		
	(128)	bit 7	0	Tx Warping Off
			*1	Tx Warping On
		bit 6	0	Constellation Normal
			*1	Constellation Expansion
		bit 5,4	* 00	16 TCM State
			01	32
			10	64
			11	Reserved
		bit 3,2,1,0		Reserved

59	15	dB	V32b/V33 7200 TCM SNR threshold

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APPENDIX 2: S-register Table for T-1496 and T-1496terbo

NO.	DEFAULT	UNIT	FUNCTION
0	2	Times	Rings before Auto Answer
1	0	Times	Ring count
2	43	Decimal	Escape code
3	13	Decimal	End-Of-Line character
4	10	Decimal	Line-Feed character
5	8	Decimal	Backspace character
6	2	Second	Dial tone detect time
7	45	Second	Time wait for carrier
8	2	Second	Pause time for ","
9	6	100 ms	Carrier detect time
10	15	1/0.1S	Lost carrier detect time (V32/V22bis)
11	72	ms	DTMF Tone Duration
12	14	100 ms	Escape sequence pause
13	3	bit 4..0	DTE speed
		0	38400 bps
		1	19200 bps
		2	14400 bps
		* 3	9600 bps
		4	7200 bps
		5	4800 bps
		6	3600 bps
		7	2400 bps
		8	1800 bps
		9	1200 bps
		10	600 bps
		11	300 bps
		12	12000 bps
		13	57600 bps
		14	76800 bps
		17	16800 bps

S-Register Table (cont.)

NO.	DEFAULT	UNIT		FUNCTION
14	00001010	binary		
	(10)	bit 0	* 0	CAL0 Calling tone off
			1	CAL1 .... on
		bit 1	0	E0 Command echo disable
			* 1	E1 .... enable
		bit 2	* 0	Q0 Status on
			1	Q1 .... off
		bit 3	0	V0 code short form
			* 1	V1 code long form
		bit 4		-----------------
		bit 6,5	* 00	&G0 No guard tone
			01	&G1 550Hz guard tone
			10	&G2 1800Hz guard tone
		bit 7	* 0	ORG0 Answer mode
			1	ORG1 Originate mode
15	00001100	Binary		
	(12)	bit 1,0	* 00	stop bits 1
			01	...........1.5
			10	 2
		bit 3,2	00	data bits 5
	(Async protocol)		01	 6
			10	 7
			* 11	 8
		bit 5,4	* 00	Parity none
			01	.... even
			10	.... odd
		bit 6	* 0	ASCII
			1	EBCDIC
		bit 7	* 0	%A0 ASI -2.5% .. +1 %
			1	%A1 ASI +2.3%

S-Register Table (cont.)

NO.	DEFAULT	UNIT	FUNCTION			
16	00000000	Binary				
	(0)	bit 0	*	0	&T0	TP off
				1	&T10	TP on
		bit 1	*	0		RDL off (Remote)
				1		.... on (Remote)
		bit 2	*	0	&T0	LAL off
				1	&T1	.... on
		bit 3	*	0	&T0	LDL off
				1	&T3	.... on
		bit 4	*	0	&T0	RDL off
				1	&T6	.... on
		bit 5	* 0		Reserved	
		bit 7,6	* 00		%T0	Test message ALT
				01	%T1	 511
17	10000000	Binary				
	(128)	bit 1,0	* 00			DTE protocol Async
				01		.... HDLC/SDLC
				10		.... BSC
				11		.... Monosync
		bit 3,2	* 00			Block check None
				01		..........CRC-CCITT
	(Sync protocol)			10		.... CRC-16
		bit 4	*	0		Long space disc.off
				1		..........................on
		bit 5	*	0		Sync character default
				1		.................user define
		bit 6	*	0		DTE address global
				1		....user define
		bit 7		0	%U0	Auto Baud rate Off
			*	1	%U1	Auto Baud rate on
18	0	Minute	Test timeout limit			
19	0	Second	Test timer LSB			
20	0	Minute	Test timer MSB			

S-Register Table (cont.)

NO.	DEFAULT	UNIT	FUNCTION			
21	01000010	Binary				
	(66)	bit 0	*	0	&S0	DSR forced on
				1	&S1	.... normal
		bit 2,1		00	&C0	DCD forced on
			*	01	&C1	.... normal
				10	&C2	V.13 HDX
				11	&C3	.... RCV Ready
		bit 4,3	*	00	&D0	DTR forced on
				01	&D1	DTR Off to command mode
				10	&D2	DTR Off Cause disconnect
				11	&D3	DTR Off Cause modem reset
		bit 5	*	0	%D0	DTR normal
				1	%D1	DTR rising auto Dial/Answer
		bit 6		0	&R0	RTS normal
			*	1	&R1	RTS forced on
		bit 7	*	0		Constant Carrier
				1		Control Carrier
22	11000100	Binary				
	(196)	bit 1,0	*	00	L0	Speaker volumn low
				01	L1	Speaker volumn low
				10	L2	.... mid
				11	L3	.... high
		bit 3,2		00	M0	Speaker off
			*	01	M1	......until DCD on
				10	M2	..... always on
				11	M3	off when dialing
		bit 6,5,4		000	X0	Blind dial,basic
				001	X1	Blind dial
				010	X2	Dial tone care
				011	X3	Busy tone care
			*	100	X4	Dial+busy care
		bit 7		0	&P0	US M/B (39/61)
			*	1	&P1	UK M/B (33/67)
23	10001010	Binary				
	(138)	bit 1,0	*	00	\N0	Direct mode
				01	\N1	Normal mode
				10	\N2	Auto V42/MNP
				11	\N3	Reliable V42/MNP
		bit 3,2		00		8 bit length on direct mode
				01		9 ....

S-Register Table (cont.)

NO.	DEFAULT	UNIT	FUNCTION			
			* 10			10 ....
			11			11 ....
		bit 6,5,4				....
		bit 7	0		%E0	Auto retrain off
			* 1		%E1	.... on
24	01000000	Binary				
	(68)	bit 1,0	* 00		W0	Standard Result code
			01		W1	Extended Result code 1
			10		W2	Extended Result code 2
		bit 3,2	00			Compromise EQ 0dB
			* 01			.... 4dB
			10			.... 8dB
			11			..........................12dB
		bit 5,4	* 00			Auto FB/FF Off
			01			.... On
			10			.....................Reserved
			11			.... Reserved
		bit 6	0			Remote Acess off
			* 1			Remote Acess on
		bit 7	* 0			AA Tone not send (Normal)
			1			Send out AA Tone (Forced on)
25	0000(240)	bit 3..0				DTR drop detection time
	1111	bit 7..4				DTR Rise detection time
26	0	10ms				RTS/CTS delay time
27	00000000	Binary				
	(0)	bit 0	* 0		&Q0	Async data mode
			1		&Q1,2,3	Sync data mode
		bit 1	* 0			....
		bit 3,2	* 00		&L0	Dial up line
			01		&L1	2W leased line
			10		&L2	4W leased line
		bit 5,4	* 00		&X0	Internal clock
			01		&X1	External clock
			10		&X2	Loopback clock
		bit 6	* 0		LTD0	Menu L->D
			1		LTD1	Auto L->D
		bit 7	* 0		DTL0	Menu D->L
			1		DTL1	Auto D->L

S-Register Table (cont.)

NO.	DEFAULT	UNIT			FUNCTION	
28	60	Minute				Timer For Leased Restore
29	00000010	Binary				
	(2)	bit 0	*	0		Fallback & Fall forward disable
				1		.... enable
		bit 1		0	&T5	RDL grant off
			*	1	&T4	.... on
		bit 2	*	0	DRL0	DTE RDL disable
				1	DRL1	.... enable
		bit 3	*	0	DAL0	DTE AL disable
				1	DAL1	.................enable
		bit 4	*	0	DFB0	Secondary channel off
				1	DFB1	............................on
		bit 5	*	0	DT	Tone Dial
				1	DP	Pulse Dial
		bit 6	*	0		Echo protect tone Off
				1		Echo protect tone On
		bit 7				Reserved
30	01101010	-dBm				
	(106)	bit 4,3,2,1,0				Leased line TX level (from 0..31)
		bit 7,6,5				Dial line TX level (from 0..-15)
31	00010000	Binary				
	(50)	bit 1,0		00	\Q0	Flow control none
				01	\Q1	.... xon/xoff
			*	10	\Q2	.... RTS/CTS
				11	\Q3	.... CTS only
		bit 2	*	0	\G0	DCE-DCE Flow control OFF
				1	\G1	.... control ON
		bit 4,3		00	\K0	Break option 0
				01	\K1	 1
			*	10	\K2	 2
				11	\K3	 3
		bit 5	*	0	N0	DCE protocol by DTE speed
				1	N1	BY MODEM negotiation
		bit 6	*	0	\B0	Not send break sequence
				1	\B1	Send break sequence
		bit 7	*	0	\X0	not pass through
					\X1	XON/XOFF pass through

S-Register Table (cont.)

NO.	DEFAULT	UNIT	FUNCTION		
32	0	bit 6,7	00		Password Security Normal
			01		Password Security by MODEM
			10		Password Security by HMS
		bit 1	0		standard AT&F operation
			1		fast AT&F
		bit 0	0		standard ATZ operation off
			1		fast ATZ operation off
33	00010110 (22)		Sync character 1		
34	00010110 (22)		Sync character 2		
35	255	Decimal	DTE address		
36	5	Minute	Time from leased to backup		
37	10	Times	Retrain Times dial backup		
38	0	Times	Redial Times		
39	00100101 (37)	Binary			
		bit 7,6			-------------
		bit 5,4	00	ECU0	disable
			01	ECU1	V42
			* 10	ECU2	V42bis
		bit 3,2,1,0	0	MNP0	disable
			1.. 5	MNPn	MNP level n (4/5)
40	00001111 (15)	Binary			
		bit 1,0	00	\A0	MNP block size 64
			01	\A1	MNP 128
			10	\A2	MNP 192
			* 11	\A3	MNP...............256
		bit 2	0		Disc. with clear down
			* 1		Immediate Disc.
		bit 3	0	ADP0	Not send
			* 1	ADP1	Send ADP/ODP in V42
		bit 5,4	* 00	\H0	None of ENQ/ACK
			01	\H1	To Host(Simulate Periphral)
			10	\H2	To Peripheral(Simulate Host)
		bit 7,6	* 00	THR0	DCD -4~-43 dBm
			01	THR1	DCD +4~-33 dBm

S-Register Table (cont.)

NO.	DEFAULT	UNIT		FUNCTION	
41	00001000	binary			
	(8)	bit 7	* 0		Bad S/N redial off
			1		.... on
		bit 6	* 0		Modem operation
			1		DCT operation
		bit 5	0		Speaker monitor Rx
			1		Speaker monitor Tx + Rx
		bit 4	* 0	\J0	speed conversion on
			1	\J1	.... off
		bit 3	0		CTS off in retraining (CCITT)
			* 1		CTS always follow RTS in data
			mode		
		bit 2	* 0		internal control in serial mode
			1		internal control in bus mode
		bit 1,0	* 00	+FCLASS=0	fax ability disable
			01	+FCLASS=1	fax class 1
42	(128)8	100ms 7,6,5,4		V42 detection period	
	0	12times 3,2,1,0		Maximum resend Times	
43	0	bit 7	0		V.32bis Fast Train disable
			1		.... enable
		bit 6	0		echo canceler length standard
			1		.... long canceler
		bit 5	0		4w echo cancel disable
			1		.... enable
		bit 4	0		Line broken disconnect disable
			1		.... enable
		bit 2,1,0			DCE inactive time
44	1	Minute		pause time before redial	
45	00001000	Binary			
	(8)	bit 7	* 0	LOCK0	Front panel lock disable
			1	LOCK1	.... enable
		bit 6	* 0	CBK0	call-back off
			1	CBK1	.... on
		bit 5	* 0		no ATT on RX
			1		10 dB ATT on RX

S-Register Table (cont.)

NO.	DEFAULT	UNIT	FUNCTION		
		bit 4,3	00		Dumb mode
			* 01		Hayes AT command
			10		V.25bis command
			11		I-tek command
		bit 2	* 0		LCD auto on/off
			1		LCD menu on/off
		bit 1	* 0		LCD always on
			1		LCD always off
		bit 0			--------------
46	17	dB	9600 TCM SNR threshold		
47	20	dB	12000 TCM / 9600 QAM SNR threshold		
48	13	dB	4800 QAM SNR threshold		
49	16	dB	2400 QAM SNR threshold		
50	0	HEX 7..4	* A		Dial-back tel# 2
		3..0	* 9		Dial-back tel# 1
51	0	HEX 7..4	* 9		Call-back tel #
		3..0	* 0		Auto-dial tel #
52	0	Decimal			Modem Link Speed
		bit 7..0	* 0		adaptive baud rate
			1		V21_300 / FAX 300
			2		B103_300
			3		V22_1200
			4		B212_1200
			5		V22_2400
			6		V23_600
			7		V23_1200
			10		FAX 2400
			11		FAX 4800
			13		FAX 7200
			14		FAX 9600
			15		V32_4800
			16		V32b_7200T
			17		V32_9600

S-Register Table (cont.)

NO.	DEFAULT	UNIT	FUNCTION
			18 V32_9600T
			19 V32b_12000T
			20 V32b_14400T
			24 FAX 12000
			25 FAX 14400
53	15	Second	Hold time before call-back
54	2	Second	Ring off time
55	18	bit 7..0	Dial Back-up Speed
			0 Adaptive baud rate
			1 V21_300
			2 B103_300
			3 V22_1200
			4 B212_1200
			5 V22_2400
			6 V23_600
			7 V23_1200
			15 V32_4800
			16 V32b_7200T
			17 V32_9600
			* 18 V32_9600T
			19 V32b_12000T
			* 20 V32b_14400T
56	23	dB	14400 TCM SNR threshold
57			Reserved
58			Time interval for Dial Tone detect.
59	15	dB	7200 TCM SNR threshold

APPENDIX 3: AUXILIARY SUMMARY FOR FAX FUNCTION

The DTE-facsimile DCE communications link shall provide full duplex character data at rates fast enough to accommodate the transfer of synchronous T.30 Phase C data. 12,000 bit/s is the minimum rate needed to support 9600 bit/s V.29 Phase C data. 19,200 bit/s is sufficient to support V.29 signaling at 9600 bit/s. With flow control, it is not necessary, and not recommended, to change the DTE-DCE communications link data rate during facsimile operation.

Flow control is necessary to match the DTE-DCE data rate to the line signaling rate and to the requirements of Group 3 data transmission. (For example, provision must be made for minimum scan line times.) In band unidirectional DC1/DC3 (XON/XOFF) flow control is mandatory; flow control using V.24 circuits 106 and 105 is optional. In the verbose format, result code responses are preceded by the ASCII characters <CR><LF>, and followed by <CR><LF>.In the non-verbose format ,result code responses are preceded by no characters, and followed by a single <CR>.

The ASCII <DLE> character (hex $10) is used as a special character, to shield special characters. The <DLE><ETX> character pair (hex $10, hex $03) is used to mark the end of a stream. The following patterns are used:

```
any data    <DLE> <ETX>        end of stream
any data    <DLE> <DLE>...      single $10 in data stream
any data    <DLE> <not DLE or ETX> delete both <DLE> & next character
```

A3.1 Command Summary

All of these commands, except +FTS and +FRS, must be the last command on the command line. The commands are:

Command	Description
+FTS=<Time>	Stop transmission and pause,(10 ms intervals 0-255)
+FRS=<Time>	Wait for silence,(10 ms intervals 0-255)
+FTM=<MOD>	Transmit data with <MOD> carrier
+FRM=<MOD>	Receive data with <MOD> carrier
+FTH=<MOD>	Transmit HDLC data with <MOD> carrier
+FRH=<MOD>	Receive HDLC data with <MOD> carrier

The MOD parameter may take on the following values:

Value	Modulation & Speed	
3	V.21 ch.2	300
24	V.27 ter	2400
48	V.27 ter	4800
72	V.29	7200
96	V.29	9600

A3.2 Capabilities Identification and Control

A3.2.1 Service Class Indication, +FCLASS?

The current Service Class setting of a facsimile DCE is interrogated by the "+FCLASS?" command. The information text response is a single value:

    0   indicates a data modem
    1   indicates a Service Class 1 facsimile DCE
    other values are reserved

A3.2.2 Service Class Capabilities, +FCLASS=?

The Service Classes available from a facsimile DCE are probed by the "FCLASS=?" command. The information text response is a list of values, separated by commas. For example, a DCE that supported data communication and facsimile Service Class 1 would respond: "0,1".

A3.2.3 Service Class Selection, +FCLASS=<value>

The Service Class may be set by the DTE from the choices available (see above) , using the "+FCLASS=<value>" command. To configure a DCE for Service Class 1, the DTE issues the command: "AT+FCLASS=1".

A3.3 Service Class 1 Action Commands

A3.3.1 Stop Transmission and Wait, +FTS=<Time>

The command +FTS=<Time> causes the DCE to stop any transmission. The DCE then waits for the specified amount of time, and then sends the OK result code to the DTE . The value <Time> is in 10 millisecond intervals.

A3.3.2 Receive Silence, +FRS=<Time>

The command +FRS=<Time> causes the DCE to listen, and to report back an OK result code when silence has been present on the line for the amount of time specified. The value <Time> is in 10 millisecond intervals. The command will terminate when the required amount of silence on the line is detected or the DTE sends the DCE another character, which is discarded. In either event, the OK result code will be returned to the DTE.

A3.3.3 Facsimile Transmit, +FTM=<MOD>

The command +FTM=<MOD> causes the DCE to transmit data using the modulation selected in <MOD>. <MOD> may have the values shown in section 1.1.

The DCE returns the CONNECT result code and transmits the proper training sequence in the selected mode, followed by constant 1 bits, until data is received from the DTE.

The DCE buffers data in this mode. The configured flow control method will be used by the DCE as necessary to pause the DTE.

If the DCEs transmit buffer becomes empty and the last transmitted character is ASCII NUL (00), the DCE shall continue to transmit NULs until the DTE sends more data or 5 seconds elapses. After 5 second elapse with an empty transmit buffer, the DCE will turn off transmit carrier and return to command state, returning the ERROR result code.

NOTE: 00 replication is useful for generating TCF (1.5 seconds of 0s) and zero-fill within lines.

When the DCEs transmit buffer becomes empty and the last transmitted character was not NUL, the DCE shall turn off transmit carrier, return to command state and send the OK result code to the DTE.

A3.3.4 Facsimile Receive, +FRM=<MOD>

The command +FRM=<MOD> causes the DCE to enter receive mode using the modulation specified in <MOD>. <MOD> may have the values shown in section 1.1.

When the selected carrier is detected, the DCE will send the CONNECT result code to the DTE.

The DCE shall return to command state upon loss of carrier, and send the NO CARRIER result code to the DTE.

The DCE shall obey the configured flow control from the DTE. If the DTE sends any character to the DCE other than DC1 or DC3 while the DCE is in this mode, the DCE shall enter command state and send the OK result code to the DTE.

A3.3.5 HDLC Transmit, +FTH=<MOD>

The command +FTH=<MOD> causes the DCE to transmit data framed in HDLC protocol using the modulation mode selected. <MOD> may have the values shown in section 1.1.

The DCE will send the CONNECT result code to the DTE, and transmit signal converter training (if required) followed by flags until the first byte of data is sent by the DTE.

When the buffer becomes empty the DCE shall compute and append the Frame Check Sequence (FCS) and a closing flag to the frame. The DCE will insure that the minimum number of flags required by T.30 are sent before the data from the DTE begins to be

transmitted.

The DCE shall check the Final Frame bit in the control field of each frame; this is the 5th received bit of the second byte of each frame. If the Final Frame bit is 1, the DCE shall cease transmitting after the frame is sent, return to command state, and send the OK result code to the DTE. If the Final Frame bit is 0, the DCE shall send the CONNECT result code to the DTE and continue to transmit flags until one of the following actions is taken by the DTE:

*   If the DTE sends additional data, the DCE shall transmit another frame.

*   If the DTE sends only <DLE> <ETX> (a null frame), the DCE shall turn off transmit carrier and send the OK result code to the DTE.

*   If 5 seconds elapses from the time when the DCE reported the CONNECT result code without any additional data transmitted from the DTE, the DCE shall turn off transmit carrier, return to command mode, and send the ERROR result code to the DTE.

The DCE performs HDLC transparency functions and FCS generation while in this mode.

The DCE buffers data in HDLC transmit mode. The DCE will use the configured method of flow-control to pause the DTE as necessary.

A3.3.6 HDLC Receive, +FRH=<MOD>

The command +FRH=<MOD> causes the DCE to receive HDLC framed data using the modulation mode selected in <MOD>, and deliver the next received frame to the DTE. <MOD> may have the values shown in section 1.1.

If the DCE detects the selected carrier with an HDLC flag, the DCE shall send the CONNECT result code to the DTE. The DCE will return to command state upon loss of carrier, sending the NO CARRIER result code to the DTE.

The DCE strips flags, and receives and buffers frames. The received data, starting with the first non-flag byte and continuing through the last FCS byte shall be transferred to the DTE. The DTE should ignore the value of the FCS bytes. The DCE performs HDLC zero-bit deletion and error checking.

After the FCS bytes are transferred, the DCE shall mark the end of the frame with the characters <DLE><ETX>, and report the status of the frame reception to the DTE:

If the frame was received correctly (FCS is OK), the DCE shall return the OK result code.

If the frame was received in error (FCS is not OK, or carrier lost, or data lost due to data overflow), the DCE shall return the ERROR result code; the DTE should discard the frame.

After the status result code, the DCE shall accept new commands from the DTE.

The DCE shall obey the configured flow control from the DTE. If the DTE sends any character to the DCE other than DC1 or DC3 while the DCE is in this mode, the DCE shall enter command state and return the OK result code.

After sending the result code indicating that frame reception is complete, the DCE shall continue to receive and buffer data in the selected mode. If the DTE issues another +FRH=<MOD> command, the DCE shall return another CONNECT result code and continue with HDLC reception. If the DTE issues any command that changes modulation, the DCE shall stop the receive process; any buffered data will be discarded and the command will be obeyed.

A3.4   Calling Sequence, Transmitting a Single Page Facsimile

DTE commands	DCE responses	Local DCE action	Remote Station Action	Notes
AT+FCLASS=1	OK	Set Class 1		
ATD<string>	CONNECT <NSF frame> <DLE><ETX> OK	Dial & send CNG Look for V.21 Detect flags	Answers Sends CED,V.21 Send HDLC flags Sends NSF Frame	AT+FRH=3 implied by dialing with +FCLASS=1
AT+FRH=3	CONNECT <CSI frame data> <DLE><ETX> OK	Detect flags get CSI get FCS accept FCS	Send CSI Frame check FCS	frame status OK
AT+FRH=3	CONNECT <DIS frame data> <DLE><ETX> accept FCS OK NO CARRIER	Detect flags get DIS get FCS send FCS detect loss of carrier	Send DIS frame DTE must detect final frame bit drop carrier	to anticipate loss of carrier
AT+FTH=3 <TSI frame data> <DLE><ETX> <DCS frame data> <DLE><ETX>	CONNECT CONNECT OK	send V.21 carrier send flags send TSI frame send FCS send flags send DCS frame send FCS flags drop carrier	detect carrier detect flags get TSI frame get DIS frame	Final frame bit clear tells the DCE to expect another frame Final frame bit set tells the DCE not to expect another frame
AT+FTS=8;+FTM=96 <TCF data pattern> <DLE><ETX>	CONNECT OK	wait 80 ms send V.29 carrier send TCF data drop carrier	detect carrier get TCF data	
AT+FRH=3	CONNECT <CFR frame data> <DLE><ETX> OK NO CARRIER	detect carrier detect flags get CFR frame check FCS accept FCS detect loss of carrier	send V.21 carrier send flags send CFR frame send FCS drop carrier	Final frame bit set frame OK
AT+FTM=96 <page image date> <DLE><ETX>	CONNECT OK	send V.29 carrier send page data drop carrier	detect carrier receive page	
AT+FTS8;+FTH=3 <EOP frame data> <DLE><ETX>	CONNECT OK	wait 80 ms send V.21 carrier send flags send EOP frame send FCS drop carrier	detect carrier detect flags receives EOP	final frame

A3.4   Calling Sequence, Transmitting a Single Page Facsimile (cont.)

DTE commands	DCE responses	Local DCE action	Remote Station Action	Notes
AT+FRH=3	CONNECT <MCF frame data> <DLE><ETX> OK NO CARRIER	detect carrier detect flags get MCF frame check FCS accept FCS detect loss of carrier	send V.21 carrier send flags send MCF frame send FCS drop carrier	Final frame bit set frame OK
AT+FRH=3 <DCN frame> <DLE><ETX>	CONNECT OK	send V.21 carrier send flags send DCN frame send FCS drop carrier	detects carrier detects flags receives DCN	final frame
ATH0	OK	Hang Up	hang-up	

A3.5 Answering and Receiving a Single Page Facsimile

DTE commands	DCE responses	Local DCE action	Remote Station Action	Notes
AT+FCLASS=1	OK RING<-	Set Class 1 detect Ringing	Dials [,send CNG]	
ATA <CSI frame data> <DTE><ETX>	 CONNECT OK	off hook, send CED, send V.21 carrier send flags send CSI data drop carrier	 get CED, detect carrier detect flags receive CSI	AT+FRH=3 implied by answering with +FCLASS=1 not final frame
AT+FTH=3 <DIS frame data> <DTE><ETX>	CONNECT OK	 send DIS data send FCS drop carrier	 receive DSI	 final frame
AT+FRH=3	 CONNECT <TSI frame data> <DLE><ETX> OK	detect carrier detect flags receive TSI receive FCS accept FCS	sends V.21 carrier send flags send TSI frame send FCS	 frame OK
AT+FRH=3	CONNECT <DSC frame data> <DLE><ETX> OK	receive DCS receive FCS accept FCS	send DCS frame send FCS	final frame bit set frame OK
AT+FTH=3	NO CARRIER	detect loss of carrier	drop carrier	DTE didn't check final frame bit and issued +FRH=3 command again
AT+FRM=96	 CONNECT <TCF data> <DLE><ETX> NO CARRIER	detect carrier receive TCF detect loss of carrier	wait 75 ms send V.29 carrier send TCF data drop carrier	
AT+FRH=3 <CFR frame data> <DLE><ETX>	 CONNECT OK	send V.21 carrier send flags send CFR frame send FCS drop carrier	detects carrier detects flags receives CFR	 final frame
AT+FTM=96	 CONNECT <page image data> <DLE><ETX> NO CARRIER	detect carrier receive page detect loss of carrier	send V.29 carrier send page data drop carrier	
AT+FRH=3	 CONNECT <EOP frame data> <DLE><ETX> OK	detects carrier detects flags receives EOP receive FCS accept FCS	waits 75 ms sends V.21 carrier sends flags send FCS drop carrier	 frame OK

A3.5 Answering and Receiving a Single Page Facsimile (cont.)

DTE commands	DCE responses	Local DCE action	Remote Station Action	Notes
AT+FTH=3 <MCF frame data> <DLE><ETX>	CONNECT OK	send V.21 carrier send flags send MCF frame send FCS drop carrier	drop carrier	 final frame
AT+FTH=3	CONNECT <DCN frame data> <DLE><ETX> OK	receives carrier detect flags receives DCN receives FCS accepts FCS	send V.21 carrier send flags send DCN frame send FCS	
AT+FRH=3	NO CARRIER	detect loss of carrier	drops carrier	
ATH0	OK	hang up		end of session

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